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Fig. 1.

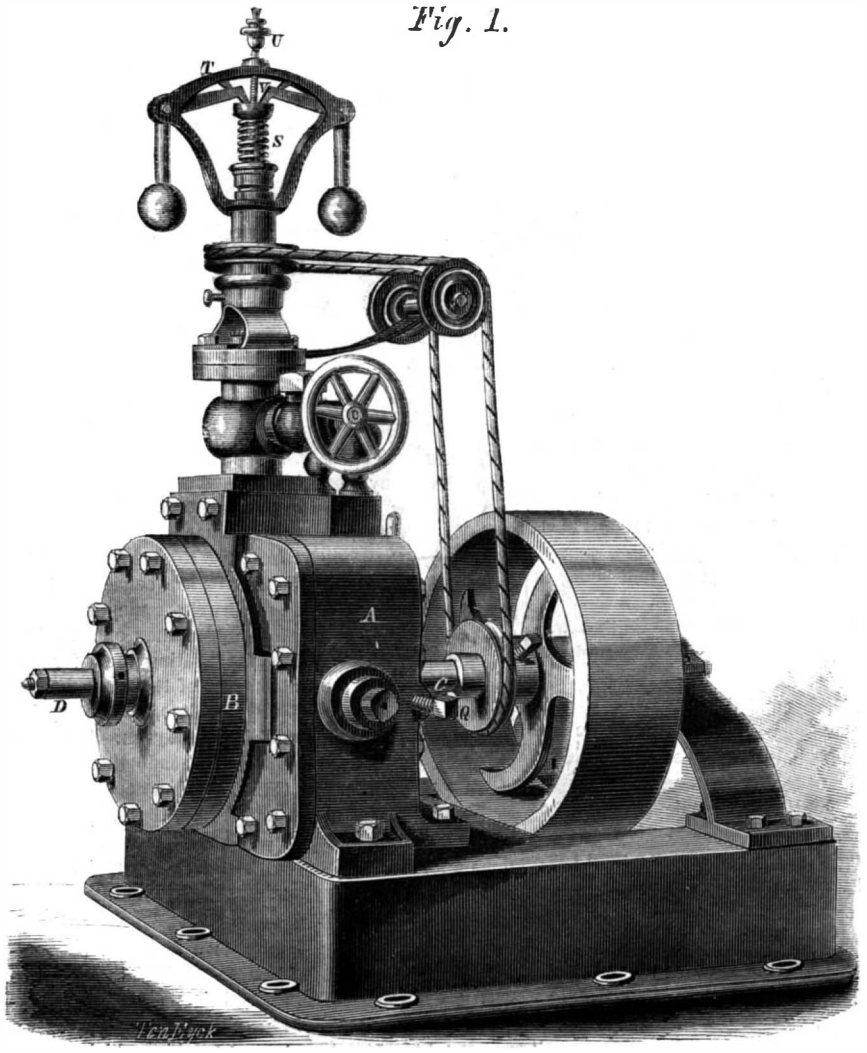


Fig. 2

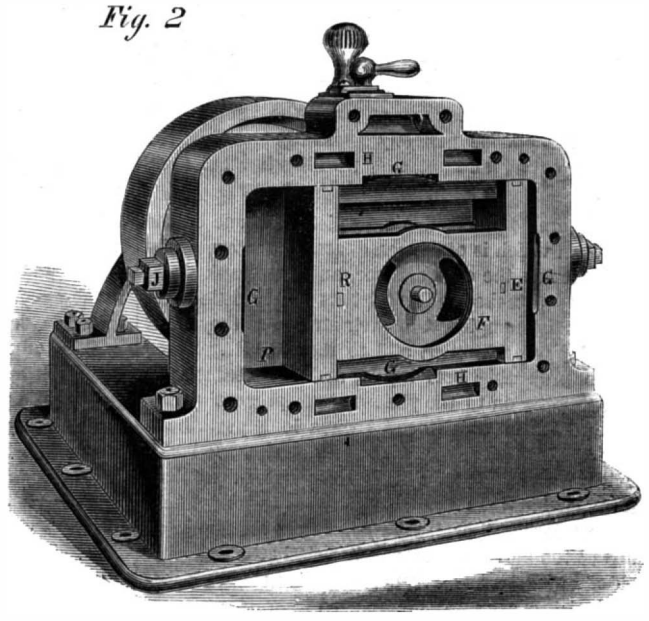


Fig. 4

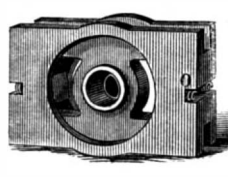
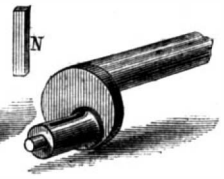


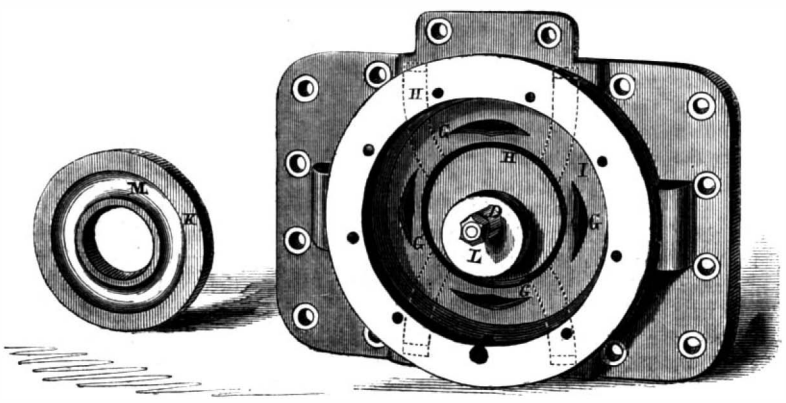
Fig. 5



ROOT'S NOVEL RECIPROCATING STEAM ENGINE.

On page 212, Vol. IX. (new series), of the SCIENTIFIC AMERICAN, we published an article entitled "A Novel Steam Engine," wherein is described a new and useful steam engine lately invented by Mr. J. B. Root, of this city; it is asserted in the article mentioned that this engine, illustrations of which are given herewith, has a combined piston area which is equal to that in an ordinary engine of 22-horse power, under the same conditions of steam pressure and piston speed. It is possible that some persons have obtained a false impression from this assertion which was not intended to be conveyed by us. There are two pistons in this engine, the combined area of which is equal to 32½ inches; the dimensions of a single one being 6½ inches long by 2½ inches wide; these pistons act in unison, so that the measure of the power is the area of the pistons multiplied by the pressure of steam and speed per minute. With this explanation, which will be amplified further along in our article, let us commence our detailed examination of the engine itself, which is the very essence of simplicity.

Fig. 3.



In Figure 1 we have a perspective view from the valve chest side. In this figure, A is the case, or what may be called the cylinder, and B is the valve chest; C is the main shaft, and D is the valve stem, which has a rotary motion; the other external parts are not peculiar with the exception of the governor, which is. In Fig. 2 we have given a side elevation of the steam cylinder, A, with the valve face removed. This valve and face is shown in Fig. 3, while the piston and its crank shaft are depicted in Figs. 4 and 5; thus the main parts, constituting nearly the whole engine, are presented in this number.

In Fig. 2, E is one piston and F is the other; they are both right-angled and parallelograms in shape; the inner one, F, is hung directly on the crank pin, and slides up and down in the other one; it will thus be seen that one piston has a vertical motion while the other works horizontally. Steam is admitted to both of these pistons at once through the openings in the valve face, and clearance is given in the cylinder, as shown at G; the openings, H, are for the four exhausts. These exhaust and steam passages are shown clearly in Fig. 3; in it the valve face is marked I and the steam ports G; the exhaust, H. These latter, where they issue from the annular passage common to the whole are shown in dotted lines; from these the steam passes into the cylinder which is cored out all around, so that the exhaust steam may be taken out at either of the two points closed by the screw plugs shown

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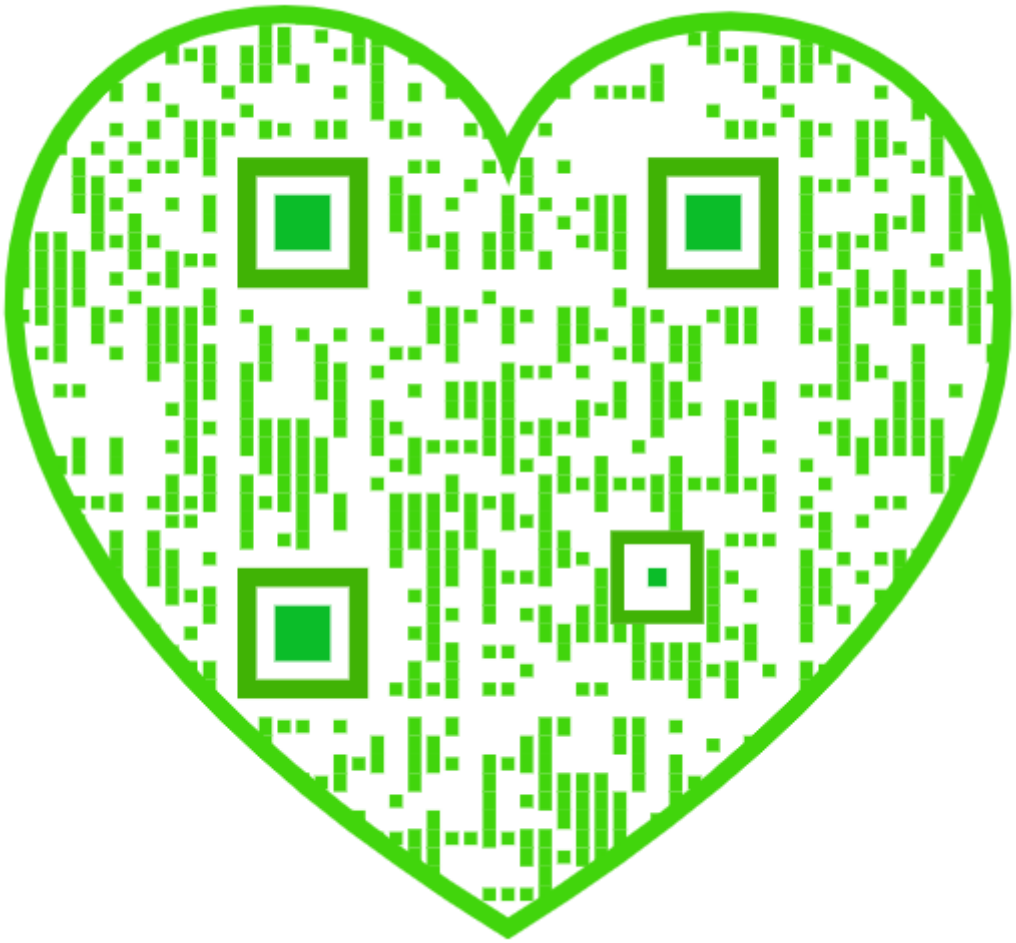

in the engravings. The valve itself is a simple metallic ring, shown isolated at K, fig. 3; the central orifice fits the eccentric L, and this eccentric is driven by the stud on the end of the crank pin, so that when the shaft is turned around, the valve has an epycycloidial movement over the valve face; opening and closing each port alternately in its passage. This is a very beautiful movement and permits the lead on each piston to be adjusted to any required degree of nicety. The hollow M, in the under side of the valve, is the exhaust passage.

The packing of these pistons is a very simple point, and yet with all its simplicity it is perfectly performed. We are assured that no leakage whatever is visible in the engine when at work. In Fig. 4, where the piston is shown separately, the packing is also shown, and requires but little explanation; the mechanical reader can see that the steel bar N, fits in the slot, O, and is forced out by the spiral springs placed therein. There is also a side plate, which is shown at P, in fig. 2; this is forced inward by wedges behind it; the wedges themselves being attached to a frame which is worked by the set-screw, Q. This plate in connection with the packing, R, makes the pistons perfectly steam-tight against the cylinder cover, and yet easy working in all of their parts.

In Figures 4 and 5, the inner piston, or one on the crank-pin which is of the same area, however, on its steam face as the external one, and the crank shaft, are shown detached. The pistons waste little or no steam at the completion of their stroke, as they work snugly up to each other, and to the cylinder. There are no projecting bolt heads, and the steam ports open directly on to the pistons, thus preventing the waste of steam which occurs when long ports have to be filled with live steam at every stroke. It is difficult to conceive of a more compact or efficient steam engine than this in the same space. There are no "centers" or "dead-points" to the crank, as each piston moves the crank alternately through one-half of its circle, consequently there is never that mechanical loss which is experienced in ordinary single engines between the times of shutting off the steam during one stroke and opening the valve for another. In this engine, we have always nearly an equal pressure upon the crank, depending, however, wholly upon the distance to which the live steam follows before it is shut off. The speed of the piston in feet is not great, as the stroke is so short, but the engines run at an average rate of 150 revolutions per minute,

One of these engines is now working a pile-driver in this city. It raises 2,200 pounds (or one tun) 36 feet in 6 seconds; taking 33,000 pounds raised one foot in a minute as a standard horse-power, the engine in question develops over 22 horse-power; for 33,000 pounds raised one foot in one minute are equal to 550 pounds raised one foot in a second; and 2,200 pounds raised 36 feet in 6 seconds are equivalent to 360 pounds in one second. One-fifth of 550=110 pounds, and three-fifths=330 pounds, or three-fifths of a horse-power for every foot of distance. The whole distance being 36 feet, it is easy to see that by this rule this engine has a power exceeding 22 horses minus friction. The pistons are 56 inches area by 5 inches stroke.

The governor of this engine is peculiar and constructed on proper principles, as it is obvious that if the arms of the governor hang vertically, and are formed at right angles with each other, the movements are positive, and no loss is experienced as is the case with the old-fashioned regulator, where the balls move perceptibly before the throttle valve is changed.

This governor runs at a high speed, and has a short screw-rod at the top which connects with the valve in the chest below; there is also another nut for altering the tension of the spiral spring, S. These nuts enable the speed of the engine to be easily controlled; for by running the nut, U, up or down on the rod, V, the spring is relaxed, or set up so that more centrifugal force is required to affect the balls, and the speed of the engine increases to make up this force; when the spring is relaxed, the reverse occurs. The governor-valve, in the chest before-spoken of, is also changed in its position in a manner not necessary to describe at present.

This engine was patented through the Scientific American Patent Agency in Sept. 1863, by J. B. Root, of New York; a patent is now pending on the governor.

These engines are made by Benjamin, Root & Co., at Jackson Iron Works, 167 East 28th street, New York, and they can be seen in operation at 155 Duane street, where all further information may be obtained.

The Invention of the Card-making Machine.

WHITTEMORE—1797.

We do not rank the card-setting machine among "the most important American discoveries and inventions," and yet we cannot omit it from our account, for it is generally regarded as coming nearest in its movements to the acts of intelligence of any piece of mechanism that has ever been devised. Two delicate needles dart forward and punch the leather; the wire is drawn in from the reel and cut off at the proper length; a fork sweeps forward and bends the wire into the form of the letter U; a pair of pincers seize the bent wire and thrust it deftly into the holes prepared for it; and finally a press rises on the opposite side of the leather and bends the wire at the proper angle to make a perfect card. All of these varied movements go on automatically and continuously, and if a crooked or imperfect tooth is made, the machine instantly stops of its own accord. This last, the stop-motion, is the only material improvement made in the machine from the form in which it was originally devised by its first inventor.

A few years since a manufacturer of these machines, a Mr. Earle, of Leicester, Mass., had a very fine machine on exhibition at the Mechanics' Fair in Boston, when the Rev. Mr. Pierpont came along with a friend and stopped to look at it.

"Here," Mr. Pierpont remarked, "is the machine that more than any other impresses me with the feeling that it must be endowed with thought."

At that time the stop-motion had not been invented, and great efforts were being made to devise it. With this in his mind, Mr. Earle replied:—

"Yes, all it needs to be a perfect sentient being is a conscience."

In the course of that season the stop-motion was perfected, and when Mr. Pierpont passed through the next Fair, he reminded Mr. Earle of the previous conversation. Mr. Earle replied:—

"The defect is now remedied. The machine has got a conscience, and it does just what a conscience ought to do—it stops at the first wrong step."

We have heard a gentleman speak repeatedly of visiting a large card manufactory in New Jersey. While he was talking with the proprietor a man came out of the mill and went off to his house. Some 15 minutes afterward our friend went into the factory, and found a very large room full of machines in active operation, with not a single person in the building to attend to them!

The card-setting machine was invented by Amos Whittemore, who was born at Cambridge, Mass., April 19th, 1759. His father was a farmer, but Amos early showed a fondness for mechanical pursuits, and, on arriving at the proper age, he became an apprentice to a gunsmith. Long before the expiration of his apprenticeship his master confessed that he could teach him no more, and advised him to set up business for himself. Some years later he became interested, with his brother William and five others, in the manufacture of cotton and wool cards, conducting their business in Boston, under the firm of Giles, Richards & Co., and supplying nearly all the cards then used in the country. Amos attended to the mechanical department.

It soon occurred to him that if a machine could be devised to perform the operations, it would supersede a vast amount of hand-labor, and would be of great value. After long and patient meditation the plan had so far taken shape in his own mind that he was ready to communicate his idea to his brother William. This brother encouraged and assisted him to the utmost, and a chamber was set apart for the construction of a model. Here the enthusiastic inventor devoted himself to the perfecting and embodying of his plans with such zeal as frequently to neglect his food and sleep. In the course of three months the machine was so far advanced as to punch the leather, and to cut, bend, and insert the wire; but the bending of the teeth at the proper angle completely baffled his genius, and he began to despair of success. While his mind was on the stretch to overcome the obstacle, one night during his sleep the idea was presented to him in a dream. Rising early in the morning he hastened to his workshop, and, before he broke his fast, he was able to announce to his brother that the machine was perfected.

Steps were immediately taken to secure a patent, and this was obtained on the 2d of June, 1797. The brothers determined also that a patent should be taken out in England, and that the inventor should visit that country for the purpose. At that time but two vessels traded between Boston and London, and in one of these, the *Minerva*, Mr. Whittemore sailed in the spring of 1799. He was absent a year, his return voyage occupying 59 days.

On the 3d of March, 1809, the patent was extended by a unanimous vote of Congress, for 14 years from the expiration of the first term. In 1812, the Legislature of New York passed an act incorporating the "New York Manufacturing Company," with a capital of $800,000, of which $300,000 was directed to be employed in the manufacture of cotton and wool cards. On the 20th of July, 1812, this company bought of the Messrs. Whittemore their patent right and entire machinery for $150,000. In 1818, the company sold all of its manufacturing property to Samuel Whittemore, a brother of the inventor, who is reputed to have made a very large fortune in the manufacture of cotton and wool cards.

After the sale of his interest in his patent, Amos Whittemore purchased a pleasant estate in West Cambridge, and retired from active business. Here, after a pure and blameless life, he died in 1828, at the age of 69 years.

MISCELLANEOUS SUMMARY.

PROFITS OF TRANSATLANTIC STEAMSHIPS.—Very few people have any idea of the enormous profits realized by the screw steamship companies in the Atlantic trade. Notwithstanding its numerous losses (averaging more than one a year), the Montreal Steamship Company has made all those who are concerned in it independently rich. The underwriters may have suffered somewhat, although the premiums on a weekly line must go far towards compensating them for one loss, even a total loss, at the end of the year; but as regards the owners and stockholders, the enterprise has been profitable beyond all expectation. The constantly recurring accidents have made the line unpopular in Canada, but there is such a constant pressure of freight both out and home, that the vessels are always full. There are two other screw steamship lines in successful operation between Great Britain and the St. Lawrence, and the merchants of Montreal are starting a fourth.

HOTEL ELEVATORS.—It appears from the proceedings of the Institute of British Architects, that the principle of hydraulic lifts is being successfully applied in the place of steam-power in many cases. The Brighton Hotel contains a machine which, moved by the weight of water with a sufficient head, raises the visitors and luggage from the lower story to the upper, which is seventy-seven feet from the ground. The elevator in the Fifth-avenue Hotel is operated by steam. At the Grand Hotel in Paris, the elevators are put in motion by means of Lenoir's gas-engine, which is said to perform its office with economy and cleanliness, and requires very little attention.

HUMBUG GOLD STORIES.—A correspondent of the Chicago *Tribune* has seen a reliable gentleman just from Idaho, and he says the story about that fifteen millions in gold awaiting transportation is all bosh; and adds that there is not gold enough dug out in the whole territory to pay the expense of getting the emigrants back home, and that all the big stories telegraphed from St. Paul and New York, just before spring opens, are the fabrications of speculators to get up a rush of deluded emigrants.

THE Portland Sugar House was established in 1845. From small beginnings the business has year by year increased, until this is now the largest molasses house in the country, with a capacity of three hundred barrels of sugar daily, giving employment, when in active operation, to over three hundred men, with a monthly pay-roll of $7,000. During the last year 34,582 casks of molasses were consumed, and the sales of sugar amounted to 53,730 barrels, or 13,611,855 lbs.

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A NEW DIFFICULTY.—The *U. S. Gazette* says :—"Nickel cents at the Mint are growing very scarce. When the Government first commenced the use of nickel as a material for coin, it made a profit on the coinage. The old-fashioned copper cent was too cumbrous, and the nickel penny was an agreeable change. Since the Government adopted the use of nickel the article has risen largely in value. All metals have risen in price. Nickel is found in Germany, but the supply to the Mint is mainly derived from Litchfield, Conn. The prospect is that after awhile the Government will find difficulty in procuring sufficient for its requirements, and some substitute will be rendered necessary. Meanwhile the demand for cents, at the United States Mint, is most pressing, and not half of it can be satisfied. The fear is that the Government will not be able to obtain nickel at such a rate that it can furnish a hundred cents or a dollar as it now does."

PRESERVATION OF GUM AND STARCH PASTE.—The paste made by gum tragacanth and gum arabic, which is so extensively used by the apothecaries in this country, acquires, particularly during the warm season, a very unpleasant and even offensive odor in consequence of fermentation, which soon commences on exposure to the air. Oil of cloves, alum and other essential oils and salts are frequently added to counteract this tendency, with but partial success, the volatile oils merely hiding to a certain degree the effensive odor developed, and retarding the fermentation incompletely. For some time past I have availed myself of the antiseptic property of creosote, which may be added to these pastes recently made, until its odor is faintly apparent. The result is their perfect preservation, no offensive odor being disengaged, and their adhesiveness is not impaired by keeping them for months.—*John M. Maisch, in American Journal of Pharmacy.*

SUGAR-MAKING FROM SORGHUM OR IMPHEE.—Messrs. C. O. West & Co., of Martinsville, Ohio, say:—"There have been several samples of sugar produced by different individuals in this vicinity, on a very cheap and simple plan, viz:—Take the most thorough granulated sirup on hand, and place on a strong linen cloth, suspended by the corners at a slight swag; prepare a vessel underneath to catch the drips, then introduce pure cold water in falling drops on the grained sirup in the cloth, stirring at the same time thoroughly, so as to cause the water to come in contact with every particle of grain; continue the process of washing in this way until the waxy or gummy tendency is destroyed considerably; then apply a press to hasten the expulsion of the liquid part, leaving the grain in the cloth, which may be put into a vessel, and will soon dry and crumble ready for market by stirring."

IMPORTANT TO CIVIL ENGINEERS.—At a meeting held on the 22d ult., in this city, by a number of civil engineers, it was resolved to organize an American Institute of Civil Engineers, the object of which shall be to facilitate the acquisition and diffusion of a knowledge of engineering science ; to create and maintain a proper professional spirit among its members ; to elevate their standard of acquirements and advance their interests. It was further resolved that an adjourned meeting be held on the 16th day of March, 1864, in the Engineer's office of the Pittsburgh and Steubenville Railroad, corner of Hand and Liberty streets, Pittsburgh, where it is expected that every civil engineer will be present to join a permanent organization.—*Pittsburgh Chronicle.*

AIR IN SIPHONS.—A correspondent writes us saying that in the event of air collecting in siphons it can be removed by putting an air chamber on the pipe at the hi hest point; the air will then collect in the chamber instead of the pipe, or else to attach a cock to the siphon and pump the air out through it and a pipe with a lifting pump. These methods are obvious to every one, and have been advised by us before, but we have been assured that they do not remedy the evil.

A BURGLAR-PROOF vault has been invented, in which a space between two of the plates is filled with iron balls about one inch in diameter, perfectly loose. The plates cannot be drilled through, as a drill must strike one of those balls, which would rotate with the tool, instead of submitting to the perforating process. One of these vaults has been put up in the Chicago Custom-house.

A NEW GRAFTING WAX.—One pound of rosin, five ounces of 95 per cent. alcohol, one ounce of beef-tallow, one table-spoon of spirits of turpentine. Melt the rosin over a slow fire, add the beef-tallow, and stir with a perfectly dry stick or piece of wire. When somewhat cooled, add the turpentine, and last, the alcohol in small quantities, stirring the mass constantly. Should the alcohol cause it to lump, warm again until it melts. Keep in a bottle. Lay it on in a very thin coat with a brush. In a room of moderate temperature, the wax should be of the consistence of molasses. Should it prove thicker, thin it down with alcohol. It is always ready for use, is never affected by heat or cold, and heals up wounds hermetically.

THE notes of all the "National Banks" bear on their faces the same gilt ring which is on the new postal currency; this ring is a sure protection against photographing, as the yellow mordant will always "take black."

THE new building of Sharpe's rifle factory at Hartford is completed externally, and will be ready for occupation in April. It will cost, with the new engine of two-hundred-and-fifty-horse power, $100,000, and when filled with machinery the whole will cost $250,000. Instead of the 475 workmen now employed, room will be given for 1,000. In the third story of the new building is a hall 208 by 40 feet, the finest audience-room in Connecticut.

THE Chicago *Tribune* says that a bed of cannel coal has been found in the Minnesota Valley, on the Cottonwood river, a little more than one hundred miles from St. Paul. The bed is eighty-eight feet below the surface where the shaft was sunk, and is six feet in thickness. All indications are that immense coal beds exist in that locality. A company has been organized in St. Paul to work the mines.

RECENT SOUTHERN INTELLIGENCE.

The following items are collated from a file of Southern papers recently received at this office :—

The *Daily Progress* (published at Raleigh, N. C.,) pays the following compliment to the members of the Confederate Congress:—

Congress has adjourned, and we suppose the members will soon be coming home, provided the faro dealers of Richmond, to whom some of them have been such good patrons, have left them enough or will lend them enough "promises to pay" to square their wash-bills and get out of town. The Congress is dead and may we never see its like again!

The Richmond *Examiner* (of February 22nd) contains the following market quotations:—

Flour is now held at $225 to $230 per barrel for superfine, and $240 to $250 for extra. Corn meal, $27 to $28 per bushel, Corn, $25 per bushel.

Bacon is very scarce, and only selling in small lots at $5 50 to $6 ; lard, $5 to $5 50 ; butter, $6 50 to $7 ; beef, $2 75 to $3 ; poultry, $3 per lb.—supplies very light.

Apples, $90 to $100 per barrel ; onions, $35 per bushel; potatoes, $9 to $14 ; peas, $30 to $35 ; beans, $38 to $40 per bushel.

Hay, $20 per hundred—scarce.

All groceries are higher. For sugar, holders are asking the extraordinary rates of $10 to $12 per lb.; sorghum molasses, $33 to $35 ; coffee, $12 per lb.; rice, 60c. to 70c.; tallow candles, $6 per lb.; vinegar, $6 per gallon ; cider, $8. Even salt has advanced, and is now going off freely at 30c. per lb. The stock has been diminished.

Whiskey is quoted at $80 to $100 per gallon ; apple brandy, $65 to $80.

The tobacco market is active, and prices tend upward.

Leather is very scarce, and since the conscription of tanners, under the new military bill, a further advance in prices is anticipated.

The prices of fuel are unchanged.

Messrs. Lancaster & Co., sold to-day, gold coin at $22 for one ; silver coin, $20 ; foreign coin, $21½.

CANNOT HELP IT.—The *Daily Journal* (of Wilmington, N. C.), under the above caption, informs its patrons that it "cannot help" putting its subscription price up to $30 per annum. Think of that, ye newspaper patrons who consider $3 per annum a large price! The same paper says there has been a great decline in household commodities, and that sugar and tobacco declined one dollar a pound in a single day. Wilmington must be a good place for speculators. In that city, also, common brown sheeting is quoted at $6.12 per yard.

$50,000 REWARD.—Mr. Henry Hart and five other mercantile firms advertise, in the Wilmington (N. C.) *Daily Journal*, that "they will pay fifty thousand dollars reward for the arrest and conviction of any person or persons who, on the night of the 8th of February, set fire to the cotton stored in their yard." Either they must have a valuable stock of cotton to afford so large a reward, or else they do not very highly value the currency in which they propose to pay the reward—probably the latter.

The *Confederate* (published at Raleigh, N. C.) contains the following:—

A GOOD SIGN.—There was no meeting of the "Agitators" in this city last night, as has been for some time contemplated. We welcome this as an omen of good. God grant it may be an indication that the leaders see the evil of their course, and are commencing to retrace their footsteps. If so, every good citizen in the land will rejoice.

The "Agitators" referred to above are the "Unionists" of North Carolina who have openly avowed their wishes to return to their former allegiance. The suspension of the *habeas corpus* act, and the relentless rebel rule under which they live, with the persecu cutions they suffer and with which they are threatened has intimidated the "Agitators" for the time being; but there is a smouldering fire in the breast of a majority of the people of North Carolina which will break out at no distant day, and then Jeff Davis and his co-traitors must look out for their necks.

TOO GOOD TO BE TRUE.—We have information from a lady just out from Knoxville, says an exchange, that the notorious Wm. G. Brownlow died in that city a few days since. There are but few we know of who have ever heard of this vile traitor and renegade, who will not regret that in dying a natural death he cheated the gallows of its due.—*Richmond Whig.*

It is good that it is not true that Parson Brownlow died at Knoxville lately. He has been sick, but we are happy to learn that he is out again, and engaged in stirring up the loyal citizens of East Tennessee to stand by the "old flag." We wish the editor of the *Whig* was the same sort of a "vile traitor" as he terms Mr. Brownlow.

THE BETTER DAY THE BETTER DEED.—The rebel Congress has appointed the first of April as the day on whi h one-third of the value of Mr. Memminger's currency will be "repudiated." The sufferers by the act of confiscation probably think this day to have been chosen in compliment to themselves, the victims of perhaps the hughest practical joke ever played off on All Fools' Day.

TO MACHINISTS AND OTHERS

Let all those interested in the mechanic arts, and in the manufacture of machinery, recollect that on Monday, the 28th of March, only one week from this, the Metropolitan Fair will open. In offerings to the good cause for which this Fair was started, mechanics and engineers must not be behind any other department. A building 150 feet long and 37 feet wide has been erected expressly for machinery. Let it be filled to its utmost limit. This much is due, not only to the cause, but to our inventors, machinists and manufacturers. For circulars or special information address A. W. Craven, Engineer, the Chairman of Committee on Machinery, Croton Aqueduct Department.

Rust Joints.

Very many persons have heard of the term "rust joint" as applied to steam engines, but do not know its significance. A rust joint is one made by cast-iron borings with urine, or salt water and sal ammoniac without the urine. In using this material when two flanges are to be joined, there is a short rib or ring cast on the face of the flanges; said rings being brought in contact with the screw bolts. There is then a space all round in which the wet borings are to be driven as tightly as possible with a steel drift, clear up to the outside of the flange. This makes a perfectly tight joint, but it must not be driven in cold weather, as the borings freeze and render the joint liable to leak; neither must any grease be allowed to touch the faces of the flanges or the borings; if this is not cared for, the joint will not rust fast and the work will be spoiled.

A Substitute for Eggs.

As a matter of general interest, we will state that corn starch is an excellent substitute for eggs for culinary purposes ; one spoonful of corn starch being reckoned equal to a single egg.—*Philadelphia News.*

[A substitute for any article must have some quality in common with that which it supplants. Eggs are only *useful* to make cakes or cookery light; their other qualities, such as enriching food or making it more palatable, are subordinate. Starch is no substitute for albumen, and cannot in any way supply the place of eggs.—EDS.

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POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

The Polytechnic Association held its regular weekly meeting at its room at the Cooper Institute on Thursday evening, March 10th; the President, S. D. Tillman, Esq., in the chair.

The President read a summary of scientific and industrial news, as follows:—

EXTRACTION OF ESSENTIAL OILS.

T. B. Graves' method of extracting wintergreen, peppermint, and other essential oils, is to mix with a watery solution of the essential oil some olive oil, and to make a soapy emulsion by the addition of potash. The soap is then to be decomposed by the addition of acid, when the olive oil will rise to the surface, bringing with it the essential oil, which may be separated by agitation with rectified spirits.

NEW PLAN FOR PRESERVING MEATS.

The British Admiralty is trying a series of experiments to test Dr. Morgan's method of preserving meats. This consists in forcing brine into the arteries, veins and capillaries of the carcase by pressure. The tank of brine is placed 20 feet above the freshly killed animal, and the brine is led by a pipe into the chest, where it enters the arteries, driving before it the blood, which passes out by an incision made for the purpose. After the arteries have been thus cleaned by the first charge, a second is introduced. This consists of 6½ gallons of brine, 10 lbs. of sugar, ¾ lb. of saltpetre, with an infusion of cloves or pepper. The meat is then cut up, thoroughly dried, and packed in sawdust and charcoal. It is said that meat thus prepared will keep in any climate, and that a larger portion of its nutritive matter is preserved than in the ordinary process.

WHITE ANTS IN JAMESTOWN.

The Admiralty is also endeavouring to find some mode of checking the ravages of the white ants in Jamestown, where this intolerable pest was introduced 20 years ago from the coast of Guinea. They have devoured the timber of the buildings with such wonderful voracity that all of the wooden houses have become uninhabitable. Mr. H. W. Bates, who has seen much of these insects in South America, recommends the use of a certain hard wood called Acapù, which it is found the ants do not eat. A paint containing arsenic is also recommended. The sleepers of the railways in India are preserved from the depredations of the white ant by creosote; but the odor of this substance precludes its use in dwelling-houses.

LIVE AND DEAD PARTS OF THE BLOOD.

Professor Beale, in a communication to the *Quarterly Journal of Microscopic Science*, says that the white corpuscles of the blood and the small red corpuscles are the only ones that are alive. The large red corpuscles are dead. He says, also, that the red coloring matter of the blood of different animals closely allied crystallizes in different forms.

IRON MOUNTAIN.

The President invited Dr. Stevens to give an account of his recent examination of Iron Mountain, Missouri.

Dr. Stevens—Mr. Chairman, the Iron Mountain of Missouri is almost exactly in the geographical center of the United States. It is an almost solid mass of specular iron ore, rising from a level plain to the hight of 260 feet, its base covering about 500 acres. Commercially, it is one of the best properties in the country. The ore contains about 67 per cent. of iron, and yields, in the large way, about one tun of pig for two tuns of ore. It costs about 50 cents a tun to quarry, little if any blasting being required. It takes about 110 bushels of charcoal to make a tun of iron. The cheapness of coal enables the pigs to be reduced to wrought iron at a low cost; and I know of no other place in the country where blooms can be made so cheaply as in Missouri. It is a fine opening for iron manufacturers. It has been claimed that Iron Mountain is a true specimen of irruptive formation; that it was thrown up in a melted state, and flowed over upon the surrounding rocks. Upon an examination of the excavations, however, I am satisfied that the ore was deposited by chemical action. Our geologists have generally held that this hill was raised in the azoic period; but the mode in which the sandstone and limestone strata rest—partly conformably and partly unconformably upon its sides and base—show that it came up after the oldest silurian deposits.

[Dr. Stevens illustrated the formation of the mountain by a sketch of its section on the black-board.]

SURFACE CONDENSERS.

The President announced that the regular subject of the evening, "Surface Condensers," was now in order, and called upon Mr. S. H. Maynard to explain Pirsson's condenser.

Mr. Maynard—Previous to entering on the explanation of the principles of that, I will answer a question put by Mr. Stetson at the last meeting—"What advantage is offered to the owners of vessels to induce them to employ surface condensation, since it is admitted that the first cost of construction is greater?" It was replied that nearly the whole extra cost could be taken from the boiler, as, with fresh water, that need not be so large. I cannot agree with the gentleman, for the reason that, with any system of surface condensation with which I am acquainted, the condensing surfaces are certain to give out, and a resort to salt feed becomes necessary. Mr. Pirsson has had unusual opportunity for careful comparison with both systems on the same ships—two particularly—on the *John L. Stephens* and the *Sonora* of the Pacific Mail S. S. Co., each of which made five consecutive trips between San Francisco and Panama, using a jet condenser feeding salt water to the boilers, and five similar trips when using his patent surface condenser, the result of which, as taken from the engineers' logs, is shown in this statement relative to the *John L. Stephens*:—

With jet condenser:—Whole running time, 64 days 14½ hours; coal consumed, 2191 tuns; oil expended, 630 gallons; tallow, 625 lbs.

With patent condenser:—Whole running time, 63 days 6 hours; coal consumed 2009tuns, 511 lbs.; oil expended, 302 gallons; tallow, 205 lbs.

As the vessel was making twenty trips per annum, the money value would be as follows:—Time saved, 5 days 10 hours; coal, 728 tuns, at $25 per tun, $18,200; oil, 1312 gallons at $1.90, $2,492.80; tallow, 1680 lbs. at 12½ cents, $210; 5½ days extra supply of passengers, say average 300, at $1 per day, $1,650; total, $22,552.80.

The log of the *Sonora*, a newer vessel than the *John L. Stephens*, showed, as the money value for the year, a saving of $33,741. She carried for twelve consecutive days, in the month of June, a vacuum of 26 inches, with the temperature of the fresh feed water at 142° Fah., though, of course, it would be less in the hot well of the large air-pump.

I have here a didactic model of Pirsson's condenser, and will premise by calling to mind the fact that, in the ordinary jet condenser, about twenty-five gallons of cold injection water is required to condense the steam made from one gallon in the boiler within the time in which it was made; and the object of employing a surface condenser is to separate the one gallon, which will be hot distilled water, from the twenty-five gallons of salt injection with which the jet condenser would have mixed it, whereby the one gallon could be available to feed back into the boiler. Samuel Hall, of England, was the first to make a practicable surface condenser, though the want of it had long been known. His condenser was well explained at the last meeting, but the leading defect which forbade its introduction into general use was not then stated. It is this: that the alternate heating and cooling of the pipes, consequent upon the periodic action required, causes an alternation of expansions and contractions, which, together with the great pressure upon the tubes, soon produces fractures in the joints and seams. When such occur, the vacuum can no longer be maintained in consequence of the flowing in of the air, and also of the water, which is fatal to the correct operation. The wear of tubes so situated must necessarily be rapid, and hence the time must sooner or later arrive when they must give out. The moment at which this will occur cannot be predicted, but it will naturally be at the time when the powers of all parts are most severely tasked, as during a storm; but then the endurance of all is most desirable. The object sought by Mr. Pirsson was to be able to continue the condensation and maintain the vacuum when such fractures did occur, and he has effected this by enclosing a surface condenser, such substantially as Hall's (and represented by this cluster of pipes which I now take out in a body), within a vessel which will be capable of serving as a jet condenser, if any derangement of the enclosed surface condenser shall require it, thus insuring the continuity of the vacuum, though at the expense of the whole or a part of the fresh water which would have been furnished if the surface condenser were intact. From this construction results the ability to maintain an equal vacuum on both the outside and the inside of the tubes thus relieving those from atmospheric pressure. The danger from leaks and fractures caused by this pressure is obviated, while, as it is no longer necessary that the joints of the tubes in the tube sheets shall be absolutely tight, it is only necessary to secure them at one end, leaving the other free to slide in the tube sheet, and, hence, disruption from alternate heating and cooling does not in this condenser occur at all. The steam is brought into the surface portion of this condenser by the usual exhaust pipe, but this passes through the side of the jet portion and enters the cap which covers the ends of the tubes. These are placed horizontally in order that they may be cooled by a shower of injection water, which effects the cooling more rapidly than an immersion of them in the cold water would do, although the system admits also of that method. A cap covers the other end of the tubes, and in this the fresh water resulting from the condensation of the steam in the tubes is collected. A small air-pump, but little greater in capacity than the feed pumps to the boiler, draws off this hot fresh water, while the large air-pump removes the injection water and the air from the outside of the tubes, in the manner of the ordinary jet condenser. An opening is cut near the upper side in the cap at the end where the fresh water is collected, and any uncondensed vapor or air which came over with the steam may pass out at this opening and be removed by the large air-pump. It will now be obvious that, if a portion of the pipes should suddenly give out, say one-tenth, the condensation would still be continued, for the steam from those would escape into the jet portion or enclosing vessel. One-tenth of the fresh water would then be lost, and, if all should break, all the fresh water would be lost, the instrument resolving itself automatically into a jet condenser of the most approved kind. If the small air-pump should become deranged, a valve can be opened in the bottom of the cap where the fresh water is collected. That will then pass off by the large air-pump and be lost, but the engine would not be crippled or even impaired in its action by either of these breaks.

Mr. Fisher—What advantage, if any, is, in your opinion, gained by tinning the tubes?

Mr. Maynard—When the tubes are made of pure Spanish copper I have not known of any advantage; but if of Lake Superior copper, which contains some iron, or of brass, the durability has been considerably extended by tinning both inside and outside.

The same subject was continued for the next meeting, and the Association adjourned.

FARMERS' CLUB.

From the several subjects discussed at the meeting of the Club on the 15th inst., we select for our columns the following:—

RHUBARB WINE.

Mr. Robinson read a communication asking if there is a market for rhubarb wine.

Mr. Carpenter—A few days since I saw in a cellar in this city 25 barrels of rhubarb wine, but it did not remain there long. It was sold for 80 cents per gallon. It was of a very inferior quality.

The President—It was probably used for extending wine of a better quality. There is a brewery in this city which we call the vineyard; it is devoted exclusively to the manufacture of liquors for adulterating or extending wines. I know the proprietor very well, and he has told me that he could not nearly supply the demand. In most of the manufactured wines the flavor is imparted by a proportion of imported wines, but in some not a particle of grape juice is used. Some of the imported wines are extended by mere water; a little alcohol being added to keep up the strength, and some sugar to maintain the body. The best form in which the saccharine matter is found is in the white liquor of the sugar refineries. This is rock-candy just before it crystallizes, and is the purest and most delicate of any saccharine substance that can be obtained.

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Mr. Williams—I am told that the rhubarb wine is much desired by our surgeons for the army. It contains a large proportion of acetic acid, and therefore I should suppose would not be suitable for diluting wines. But it is found to have a very powerful effect in destroying the taste for alcoholic drinks. I have long known that nothing else is so effective in destroying the taste for both spirits and tobacco as a strong acid.

Mr. Robinson—It has been stated here as the result of experiment that 2,500 gallons of rhubarb wine can be produced on an acre.

SENDING SCIONS.

Mr. Carpenter having offered for gratuitous distribution some scions of the American Golden Pippin, Dr. Parker, of Ithaca, remarked, that he had had a great deal of experience in sending scions, having received them from all parts of this country and Europe, packed in a great variety of ways, and that the only safe and proper way to send them, is to touch the ends with a thick solution of gum arabic and wrap them in dry paper. They should, when received, be packed in dry sand in a box, and buried about two feet deep on the north side of a building. The box should have an inclined top to shed the rain.

IMPREGNABLE ARMOR.

The following is an extract from a paper transmitted to the Secretary of the Navy, on January 18, 1863, by Mr. John Ericsson :—

"The English have failed in producing an armor capable of resisting projectiles of great speed and weight. Solid blocks of wrought-iron of the best quality, one foot in thickness, have been split under the impact of the projectile. The enormous dynamic force lodged in the shot, compared with the inadequate cohesive force of the metal at the place struck, together with the incompressible nature of the material, furnishes a ready explanation of the cause of the fractures which have resulted from heavy charges of powder at short ranges with the solid English targets.

"Having attentively studied the subject, and demonstrated satisfactorily the cause of the unexpected destruction of the enormous solid targets, the expedient at once suggested itself to the writer, of applying a *laminated* protection in order to exhaust the *vis viva* of the shot, by degrees, before reaching the solid blocks intended as the real armor. The peculiar feature of the laminated protection is evidently that each successive lamina, or plate, may be split without affecting the next; forming, as it does, a separate body placed at a measurable distance from the neighboring plate. Not so with a solid projectile; a split or crack of sufficient width must inevitably—owing to the incompressible nature of the material—run through the entire substance. Hence the destruction of the enormous blocks of wrought-iron tested in England.

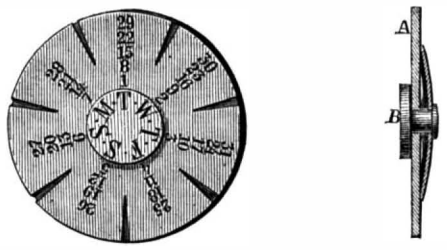
"The condition of my 15-inch target, recently tested by Captain Dahlgren, at the Washington Navy Yard, proves incontestably that, by interposing a laminated protection, armor may be made absolutely impregnable. Not only are the 5-inch wrought slab and the backing of 4-inch plating—together 9 inches—completely uninjured ; but there remain also in the centre of the indentation made by the shot, more than 2 inches thickness of the outer plating. The absolute protection thus afforded by the 6-inch thick plate lining to the 5-inch wrought slabs of the 15-inch target, placed close to the muzzle (34 yards) of an XI-inch Dahlgren gun, fired with 30 pounds of powder, proves conclusively that the side armor of the *Puritan* and *Dictator* will be impregnable. This side armor, it will be remembered, is composed of 6-inch plating, under which is inserted the longitudinal wrought-iron slabs (stringers), backed by the 4-feet thickness of oak, firmly attached to the side of the ship without the employment of the objectionable through-bolts employed in the *Warrior* and other European iron-clads."

Two mines are now worked in Newfoundland—one of lead and one of copper—each employing over one hundred persons.

LARGE quantities of cotton are stored at Huntsville, Ala., now in possession of our forces. Every house or yard has one or more bales.

CROSBY'S POCKET CALENDAR.

This engraving represents a convenient little article for which every one has use at some time or other. The day of the month is always known by a person carrying one of these little calendars in his pocket. This is accomplished in the following manner :—The metallic disk, A, is fitted with a dial, B ; the disk has seven rows of figures radiating from the center, corresponding with the seven days of the week, whose initials are marked on the central dial. It will be seen that by turning the central dial so that the first day of the week which commenced the month comes opposite the figure it began on, the reader can readily calculate any time after that from the other



figures. For instance, the present month, March, began on Monday, the figure 1 on the calendar should therefore be opposite the letter, M ; each succeeding day or week is readily counted when the first one is known. To prevent the central dial from shifting it is held down by a spring shown in the section, this keeps it securely in position. This is a very convenient article, and is sold at the low price of 25 cents. Specimens will be sent to any address on receipt of price. The entire patent or rights for States for sale. Patented Feb. 18, 1864, through the Scientific American Patent Agency ; for further information address the inventor, D. E. Crosby, 32 Fulton street, Brooklyn, N. Y.

Important Circular from the Navy Department.

The Navy Department has issued the following circular to each of its inspectors of machinery:—

"SIR:—The great damage which has been sustained by the Navy Department from the poor materials and bad workmanship used by some contractors in the manufacture of its steam machinery, requires that every possible precaution and vigilance on the part of its inspectors should be exercised to prevent their occurrence in the future.

" The loss to the Government from badly-built machinery is not to be measured by the money cost thus saved to the contractor. It is immeasurably greater; the giving way of a part in which but a few dollars could be retrenched by the substitution of inferior materials, or the employment of unskillful labor, may involve the loss of the use of a steamer at a time when her services may be worth more than her whole commercial value; in fact, at a time when an event of national importance, not to be measured by money at all, may depend on her efficiency. Your patriotism, as well as your honor, honesty, and professional reputation, is involved in the performance of your duty with inflexible fidelity to the Government, and you are expected to give your whole time and your whole mind to the important work which the department has committed to your supervision. For any omission or defects arising from neglect of this you will be considered responsible; and any presents made by contractors to any person in the employment of the department will be viewed by it with strong disapprobation, and the reception of such present will be sufficient cause for removal.

"Your attention is particularly called to the following points:—

"1st. That the boiler plate is of the first quality, highly malleable, ductile and tough capable of being tightly compressed by the rivets, and of being calked in a durable manner. It is impossible to make a tight boiler of inferior iron. The rivets should be of the best quality of iron that it is possible to make, and thoroughly worked. The double-riveted seams are to be made true and fair, and calked on both sides. There are but few places where this cannot be done, whereas it is believed there are many cases where it is not done. The rivets are to be staggered, and not placed too far apart. It should be remembered that the principal object of double-riveting in rectangular boilers is tightness, not strength. Neither acids nor 'quakers' to be allowed in making the seams.

"2d. The tube plates are to be drilled, not punched, and to the precise diameter of the tube, so that the latter fits the hole absolutely tight before being expanded. Immense loss has been inflicted on the department by some contractors making the tube holes from one thirty-second to two thirty-seconds of an inch too large in order to secure a cheap and easy fit of the tube; and the latter, being of too poor material to endure the expansion required to fill a hole so much too large, splits at the ends and leaks ever afterwards. This leakage, even at only a few joints, with iron vertical water tubes, soon destroys all the tubes in the box; the lye formed by the water with the coal ashes and soot on the lower tube plate spreading over the entire bottom of the box and rapidly corroding out the lower part of every tube in it. You will be vigilant to see that the diameters of the tube holes are accurate. Nothing is so destructive to a boiler as leaks, and no pains or cost should be spared to prevent them. The socket bolts of the water bottoms should all have heads on the inside, and on the outside large washers and nuts.

"3d. As the boilers are intended for carrying high steam, and are braced for the same, you will be particular to secure in the crow-feet, half-moons, joints, angle and T-iron, pins, &c., and in the riveting by which the braces are attached to the boiler shell, the same strength which the specifications require in the braces. It is obviously useless to make a boiler for high steam and attach its heavy bracing to the shell by a system of riveting with strength inferior to that of the braces.

"4th. The quality of the iron for the cylinder and its valve should receive your most anxious scrutiny. It should be of the best scrap, carefully selected, tough, with a fine compact grain, and so hard that the tool can barely work it. The cylinder and its valve must be cast at different times and of different metals. With steam of high pressure and superheated, the greatest care is required in securing the proper quality of metal and workmanship for horizontal cylinders with slide valves. The boring of the cylinder and the facing of the valve and its seat should be perfect.

"5th. The main and crank-pin journals must be turned perfectly true from end to end, and highly polished. They must also be mathematically in line and without a flaw.

"6th. The brasses for these journals must be of the composition required in the specifications, and you will personally be present and see the metals weighed out in the proper proportions, mixed and poured. They are to be first bored and channeled, and then scraped to their journals. They are to have sufficient end play to allow for expansion when heated. They are to be closely examined, and, if not of uniform texture, rejected. You will personally see to the securing of the thrust pillow-block, and to the quality and workmanship of its brasses. You will personally superintend the 'lining' of the engine. You will give particular attention to the tightness of the joints, especially of the vacuum joints, and to the packing of the engine. The lignum-vitæ in the pump packings and in the stern bushings is to be thoroughly soaked before being bored to the required diameter."

"GIDEON WELLES, Secretary of the Navy."

THE Michigan petroleum, lately discovered, has been analyzed, and found to be of a very superior quality. It has less odor than the crude Pennsylvania oils, and will yield 20 per cent more of the refined article than the former. Its specific gravity is 40°. That of the Pennsylvania oil ranges from 45° to 47°. Albion petroleum is easily deodorized, and, when refined makes a clear white oil that burns freely, and is entirely non-explosive. It yields but little naphtha, and stands a fire test of 140°.

TO MAKE LARD CANDLES.—To every eight pounds of lard add one ounce of nitric acid, and the manner of making it as follows:—Having carefully weighed your lard, place it over a slow fire, or at least merely melt it; then add the acid, and mold the same as tallow, and you have a clear beautiful candle. A small proportion of beeswax makes them harder.

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Correspondence

Artificial Ivory.

MESSRS. EDITORS :—In accordance with the promise given in our last communication [see page 166] we now furnish you with a brief account of the various substitutes for natural ivory that have been introduced or brought under our notice.

The first in priority of date was an articled styled "Compressed Ivory," which was nothing more than a composition of ivory dust and flake-white, cemented together with a strong solution of white shellac, and moulded by pressure into the required spherical form. Its liability to crack was the principal among many other objections to its employment in the manufacture of billiard balls. *Gutta-percha*, soon after its introduction into the mechanical and manufacturing arts, was tried ; but its susceptibility to atmospheric influences (the balls becoming clammy and moist in wet weather) was fatal to its successful employment for the purposes desired. *Vulcanized india-rubber* was next essayed ; and the billiard balls made from it came nearer to the natural ivory balls than any we have hitherto seen or tried. They were of the proper size and weight (the latter quality being given by the admixture of black or white lead), and appeared to answer well in actual play, and were not affected by the weather. The insuperable objection against this article is its color, as it cannot be, or has not hitherto been, capable of being bleached, so as to obtain the white and colored balls which are so absolutely indispensable in the game of billiards. *Vegetable ivory* and *glass* have been suggested, but neither will answer ; the former possesses too great friability, breaking when the balls are brought into violent contact; the same objection applies, in a still greater degree, to glass. *Porcelain* balls have been tried, and found wanting, as the external surface chips and breaks off. *Walrus teeth* have been recommended, but their scarcity and other objectional features prevent their employment. The substitute most recently proposed is *steel*, but hitherto the principal objection to its employment has not been overcome.

The above comprise all the articles which have been experimented upon as a substitute for ivory, or as many as have come under our notice ; none of them afford all the essential qualities required. Our offer of the reward of $10,000 will, we trust, have the effect of stimulating the inventive genius of scientific men and effecting the desired object, as we believe that the substitute sought will be found in an artificial composition ; all natural productions, hitherto tried, having totally failed. PHELAN & COLLENDER.

63 Crosby street, New York City, March 7, 1864.

Cause and Preventive of "Interfering" of Horses' Feet.

MESSRS. EDITORS:—The cause of "interfering" is not owing to the slipping of horses, as many suppose, for all horses slip more or less; but it is due to traveling with their feet too close together. To prevent it, make the inner half or halves of the shoe or shoes one-eighth of an inch thicker than the outer half or halves, and set them even with the face of the hoof. They will travel then far enough apart to not cut themselves when they slip. S. FORMAN.

New York, March 12, 1864.

[This subject is one of great interest to all keepers and owners of horses, and in regard to which there is a wide difference of opinion. Some horses "interfere" in spite of all the skill of the shoer; thus showing that it must result from some infirmity in the animal.—EDS.

Removing Incrustations from Steam Boilers.

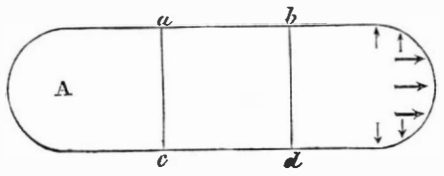
MESSRS. EDITORS:—In your paper of the 9th of January (page 21), among notices of recent patents granted in England, is a composition of gambier terra-japonica, catechu, and myrabolams, for the prevention of incrustation in steam boilers. The two former are the extractive matter of certain trees containing tannin, grown in the East Indies, boiled down into a paste, and then dried into an earthy-looking gum; hence the name of terra-japonica. Myrabolams are pods from some species of acacia, grown in South America, and their value depends upon the tanning principle contained in them. We have received circulars in reference to certain powders to prevent incrustation, which are offered at the modest sum of fifty cents per pound, being nothing but gambier. Now I have used strong fresh tanning liquor, say about 24 gallons for a boiler 3 feet by 22, with the most perfect success; this is the cheapest, the easiest and simplest; once a month this quantity is ladled into the man-hole; care must be taken not to put too much in, as the boiler is apt to foam. This is no new remedy, the detergent properties are no doubt due to the tannic acid; then what is the use of paying a high price for powders when a barrel of strong tan liquor can always be procured? I would like to hear, through the SCIENTIFIC AMERICAN, the experience of those using tanning liquor for the above purpose. J. B.

Santa Cruz, Cal., Feb. 18, 1864.

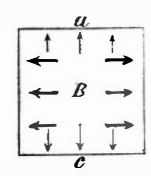
[Very many engineers, in this country, place sticks of green oak or hemlock wood and also bark in their boilers, and thus obtain the same principle that our correspondent mentions. More recently we are told that placing brush or branches of trees in the boiler has been attended with good results, as the lime or scale was deposited on them instead of the iron. It is, as we have often said before—what will answer in one case is ineffectual in another.—EDS.

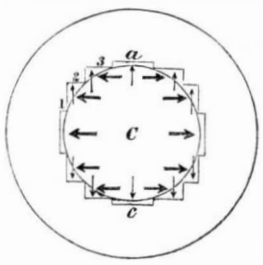
Strength of Steam Boilers.

MESSRS. EDITORS:—Your correspondent, T. W. B., on page 134, is in error. A cylindrical boiler of uniform thickness and texture will separate in a plane of its axis and until the parts are actually rent asunder the tendency of the steam, pressing as it does equally in every direction, is to preserve the circular contour, rather than to destroy it, and the effective rending



force is wholly at right angles to the diameter. Take for illustration a section, *a b c d*, one foot in length in a cylindrical boiler, A, of one foot interior diameter. There will be an effective bursting pressure vertical to the plane of the section, precisely the same as though the boiler were a square trunk of the same width, and of which the diagram, B, may be considered a transverse section, *a* and *c*, representing the points of fracture, and the strong and faint arrows representing respectively the effective and non-effective rending pressures. The case will not be different if we suppose the boiler composed of numerous corrugations, 1 2 3, &c., see the diagram, C, in which the aggregate of effective and non-effective rending surfaces are precisely the same as in the form B.





That the boiler will separate most readily in a longitudinal fracture is evident, for suppose the pressure per square foot represented by *p*, each fracture *a b* and *c d*, of one lineal foot receives the half of this force or the two lineal feet combined receive a force of *p*, compared with which the force against the end of the boiler will be that of $\frac{7854}{10,000}$ to 1, or about $\frac{3}{4}$, which force being divided among the $3\frac{1416}{10,000}$ feet of circumference, leaves a rending force of but about $p \div 2$ to every two lineal feet.

GEO. H. KNIGHT.

Cincinnati, Ohio, Feb. 29, 1864.

MESSRS. EDITORS :—It was with much pleasure that I saw the article of Mr. Toshach, a few weeks ago, in the SCIENTIFIC AMERICAN, concerning the strength of steam boilers ; the formula for finding the amount of strain they would bear, &c., affording most valuable and reliable information to a class of men, among whom are too many not in the way of getting such knowledge, unless it is "handed down" to them. With the view of seconding the efforts of Mr. Toshach in this matter, I wish to enumerate the principles on which the construction of his formula depends ; being persuaded that the reason of a thing will dwell in the mind long after the abstract fact is forgotten. More especially do they seem to be called for, since the untenable remarks of Mr. T. W. B., in relation to the formula.

The *strength* of the shell (other things remaining the same) varies as the *thickness* of the plate forming the shell.

The *strain* to which the shell of a boiler is subjected, under a given pressure of steam, varies as the *diameter* of the shell. Your correspondent, T. W. B. [see page 134] objects to this, and says it is as the circumference. Now as the ratio between the circumference and the diameter of a circle is a *constant quantity* for all circles, his objection vanishes.

And if the pressure of the steam and the diameter of the shell both vary, then the thickness of the shell must vary as the product of the ratios by which the other elements vary. Example :— If the diameter of shell and head of steam are both *doubled*, then the thickness of the shell must be *four-fold ;* or if one is doubled, and the other is halved, then the thickness remains *constant*, &c.

If boilers of different diameters are made of the same thickness of plate, then the pressure of steam they will carry will vary *inversely* as the diameter of the shell—or in other words, the greater the diameter of the shell, the less is the pressure of steam that can be carried.

Experiment has determined the absolute strength of the different kinds of material used in boiler-making ; so that, with the preceding principles and the formula of Mr. Toshach (which flows from them) fixed in the mind, and taking the results of experiment for a starting point, the young boiler-maker may proceed in his work with a degree of confidence and self-reliance, experienced only by those who know what they are about. H. C. PEARSONS.

Ogdensburgh, March 2, 1864.

[Our correspondent is in error about T. W. B.'s position; he asserts the strength is as the semi-circumference—not as the circumference.—EDS.

MESSRS. EDITORS :—At page 134, present volume of the SCIENTIFIC AMERICAN, you published a communication (from me) on this subject, which may require further explanation. The point at issue is the pressure to rupture a cylindrical boiler—whether as the diameter or semi-circumference. The latter is held by the writer of this letter. The required resistance to force increases with the obliquity, and may be illustrated by a tightly stretched string ; where a given force is applied to break it in the direction of the string—or *on* the string—the extreme of obliquity being perpendicular thereto, and is theoretically infinite. Hence if the considered points of rupture be horizontally opposite—the upper and lower parts of the boiler will, by their more *direct* action, have less effective parting force than the remaining lateral portions of the boiler obliquely resisted. If a vertical tie-bolt be inserted with a view of supporting the said horizontal points, the boiler would nevertheless be parted (exploded) at those points by the lateral obliquely-resisted pressure ; but if the tie-bolt were removed from its vertical position, and placed horizontally across the boiler, the horizontal points in question would be secured, and the boiler parted at top and bottom. In short, security would follow the tie-bolt, wherever placed, up to relief by transverse explosion. T. W. B.

Cincinnati, Ohio, March 12, 1864.

The Term "Ratchet."

MESSRS. EDITORS:—*Brande's Encyclopedia* defines the word "ratchet" as meaning, properly and primarily, the pawl or detent. Is not that altogether wrong? Some information from you, as to the history and proper use of that word will oblige—

S. P.

[*Brande's Encyclopedia* is correct. The word "ratchet" is synonymous with "pawl;" and the teeth of the rack in which it plays are called "ratchet teeth;" when in a wheel, the combination forms the "ratchet wheel." Common usage, however, styles the ratchet as a *pawl;* and this is a good name, as it avoids confusion of terms and ideas.—EDS.

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The Best Lime for the Calcium Light

MESSRS. EDITORS:—Having had occasion to use the oxy-hydrogen or Drummond light, I was much annoyed by the breaking of the lime cylinders. Having tried various substitutes, I find that lime made from Italian marble is the most satisfactory. It does not crack, gives a good light and is easily prepared. Small pieces of white marble are put into a clear fire, in a stove or open grate. After remaining at a red heat for twenty to thirty minutes it is, after cooling, easily cut into any desired shape. R. DOUGAN.

Washington, Pa., March, 2, 1864.

A Hint to Letter-writing Bores.

We consider as a general thing that our correspondents are a fair and high-minded set of men, such as we are most happy to accommodate by answering, so far as it is in our power, all their inquiries; but there are a few of whom we can very justly complain. They put to us all sorts of questions, to answer which might require a half-day of our valuable time; and if we snub them off with a short answer they are likely to reply back in complaining terms. It cannot be reasonably expected of us, that we should spend our time in such—to us—profitless letter-writing. We mean to be accommodating, but cannot consent to waste all our time in getting information for correspondents who seem not to know how to appreciate either our forbearance or the value of our time. As an example of what we mean, we have a case before us. A correspondent wants us to hunt through our files for a notice of some book which appeared in the SCIENTIFIC AMERICAN some years ago, and to help him find the book. He also wants us to find for him an English book which we do not believe can be had in this market. Another correspondent wants us to send to England, without delay, to get something which would require time and money to procure for him, but in regard to which he don't even enclose a three-cent postage stamp to prepay our letter. Another encloses three cents and wants a calculation made which would cost us two hours' hard study. It is well enough for all such correspondents to know that our time is worth to us more than a cent and a half per hour. Treat us fairly, and you will have no cause of complaint.

TRIVIAL THINGS.

A sarcastic correspondent writes to us, complaining of our publishing such information as the following:—"Rimmers should not be used in the cored-out holes of castings, as the sand and scale ruin the edge in a short time." He intimates that he knew this a long time ago, and, as a natural sequence, we had no right to put such matter into the SCIENTIFIC AMERICAN. This article is not directed toward that particular correspondent any more than to others who entertain similar views; a little reflection will convince any one how illogical and unreasonable the objection is. Suppose Professor Morse should write us, saying he had read something about the telegraph in the SCIENTIFIC AMERICAN, and considered it really too trivial, as he knew it all years ago; or that Professor Seely, having perused some article on chemistry, should immediately devote four pages to a scathing review of a two-line item; just because he had, in the progress of his studies, learned said elementary knowledge when he was a school-boy. The fact of the matter is, that a newspaper is analogous to a public table; we pay our money and we take our choice. We cannot go to the hotel and order the landlord to carry off the roast beef because we ate roast beef twenty years ago, and don't like it now, for they may be others who do. So it is with elementary knowledge; there are hundreds of accomplished mechanics like our correspondent, who know all about rimmers and grinding-drills, &c., but they have only become accomplished because they *did* know these things and every day experience their value; therefore to the apprentice who is growing up in his trade such reminders as we have mentioned are never lost; for a word in print is remembered longer than a chance caution dropped by some hasty foreman; or it may be the youth is never told and only learns by that hard master, experience, under whose rod we all of us come in the course of life,

Let us not despise little things because they do not happen to be new to us; to *others* they are invaluable, and in no instance does the lesson fail to impress itself upon the mind of those who read, not "as they run," but for the purpose of storing their minds with sound information.

Small Leaks in the Household Ship.

A thousand worm-holes, that will each admit scarcely a gallon of water during ten hours, will much sooner water-log a ship than a large hole through which is poured a gallon a minute. In the financial affairs of a family, though the large outgoes may be canvassed and avoided, the whole income may be *dribbled* away, and no advance be made toward competency, wealth, or position. As a rule, the financial success of any family depends more upon the economy of the wife than upon the earnings or business income of the husband. Mrs. Haskell, in her recently issued "Household Encyclopædia," throws together some of the small leaks in a household ship, which we copy for a double purpose: 1st, to show the men that their wives have a multitude of cares, of little details, to look after—generally far more items than occur in man's business pursuits; and 2d, to perhaps in some cases indicate to housewives details that they may not have thought of before:—

"Much waste is often experienced in the boiling, &c., of meats. Unless watched, the cook will throw out the water without letting it cool to take off the fat, or scrape the dripping pan into the swill-pail. This grease is useful in many ways. It can be burned in lamps mixed with lard; or, when no pork has been boiled with it, made into candles. When pork is boiled alone, it will do to fry cakes, if cleansed. Again, bits of meat are thrown out which would make hashed meat or hash. The floor is sifted in a wasteful manner, or the bread-pan left with dough sticking to it. Pie-crust is left and laid by to sour, instead of making a few tarts for tea, &c. Cake batter is thrown out because but little is left. Cold puddings are considered good for nothing, when often they can be steamed for the next day, or, as in case of rice, made over in other forms. Vegetables are thrown away that would warm for breakfast nicely. Dish towels are thrown down where mice can destroy them. Soap is left in water to dissolve, or more used than is necessary. If Bath brick, whiting, rottenstone, &c., are used, much is wasted uselessly. The scrub brush is left in water, pails scorched by the stove, tubs and barrels left in the sun to dry and fall apart, chamber pails allowed to rust, tins not dried, and iron-ware rusted; nice knives used for cooking in the kitchen, silver spoons are used to scrape kettles, or forks to toast bread. Rinsing of sweetmeats and skimmings of sirup, which make good vinegar, are thrown out; cream is allowed to mold and spoil; mustard to dry in the pot, and vinegar to corrode the castor; tea, roasted coffee, pepper and spices, to stand open and lose their strength. The molasses jug loses the cork, and the flies take possession. Sweatmeats are opened and forgotten. Vinegar is drawn in a basin, and allowed to stand, until both basin and vinegar are spoiled. Sugar is spilled from the barrel, coffee from the sack, and tea from the chest. Different sauces are made too sweet, and both sauce and sugar wasted. Dried fruit has not been taken care of in season, and becomes wormy. The vinegar on pickles loses strength or leaks out, and the pickles become soft. Potatoes in the cellar grow, and the sprouts are not removed until they become worthless. Apples decay for want of looking over. Pork spoils for want of salt, and beef because the brine wants scalding. Hams become tainted or filled with vermin, for want of the right protection. Dried beef becomes so hard it can't be cut. Cheese molds, and is eaten by mice or vermin. Lard is not well tried in the Fall, and becomes tainted. Butter spoils for want of being well made at first. Bones are burned that will make soup. Ashes are thrown out carelessly, endangering the premises, and being wasted. Servants leave a light and fire burning in the kitchen, when they are out all the evening. Clothes are whipped to pieces in the wind; fine cambrics rubbed on the board, and laces torn in starching. Brooms are never hung up, and soon are spoiled. Carpets are swept with stubs, hardly fit to scrub the kitchen, and good new brooms used for scrubbing. Towels are used in place of holders, and good sheets to iron, taking a fresh one every week, thus scorching nearly all in the house. Fluid, if used, is left uncorked, endangering the house and wasting the alcohol. Caps are left from lamps, rendering the fluid worthless by evaporation. Table linen is thrown carelessly down and is eaten by mice, or put away damp and is mildewed; or the fruit stains forgotten, and the stains washed in. Tablecloths and napkins used as dish-wipers; mats forgotten to be put under hot dishes; teapots melted by the stove; water forgotten in pitchers and allowed to freeze in winter; slops for cow and pig never saved; china used to feed cats and dogs on; and in many other ways a careless and inexperienced housekeeper will waste, without heeding, the hard-earned wages of her husband; when she really thinks, because she buys no fine clothes, makes the old ones last, and cooks plainly, she is a most superior housekeeper."

The next time an unthinking husband is disposed to be severe because some trifling matter has been neglected, he should "put that in his pipe and smoke it."—*American Agriculturist.*

Loading Guns by Steam.

The English are great hands at getting up "new" things after they have been invented by somebody else first. An individual named "Walker" (a significant appelation) claims the armor on the Monitors as his discovery, and now another person, Mr. Cunningham, has just invented an apparatus for working large guns by steam power, and thinks it is a great novelty. Capt. Eads, of St. Louis, Mo., has now nearly ready for service a gunboat called the *Milwaukee*, which is an iron-hull gunboat with two revolving turrets, one of which is invented and patented by James B. Eads, and the other is after the plan of Capt. Ericsson. Both mount two eleven-inch Dahlgren guns. In Mr. Eads's turret the guns are moved entirely by steam, and are loaded in the hold of the vessel, and raised by steam to be fired. They are run out by steam and recoil against steam, one man being all that is needed to work the guns, with the exception of loading them. The portholes are only the size of the muzzles of the guns, yet twenty-two degrees of elevation and five degrees of depression can be obtained from them. It is now over two years since Edwin L. Stephens, Esq., exhibited a steam-loading apparatus on board of the *Naugatuck*.

A Chorus of Anvils and Artillery.

At the inauguration of the new Governor of the free State of Louisiana, which was celebrated at New Orleans on the 4th of March, the music probably surpassed, in noise at least, anything previously attempted. It was arranged and conducted by Mr. P. S. Gilmore, of Boston. The voices of 8,000 school children were accompanied by the strains of several military bands, and the chorus was swelled by the beating of 50 anvils, by the ringing of all the bells in the city, and by the thunder of 50 pieces of artillery! The cannon were fired simultaneously by one electric wire, the ends of which were brought to Mr. Gilmore's table, and the times of ringing the bells were controlled by connecting a wire from the table with the telegraph of the Fire Department. It is said that this bold and novel experiment was entirely successful, and that the blending of tremendous sounds was impressive beyond description.

A Novel Patent Case.

An interesting proceeding took place on Saturday, in the Supreme Court of the District of Columbia. The question involved was whether one of several assignees of a patent-right could legally apply for a re-issue. Mr. Holloway, the Commissioner, decided negatively, and, on Saturday, the assignee in question got a mandamus from the Supreme Court of the District to show cause why proceedings in respect to the application for re-issue had been stayed. John L. Hayes, Esq., the chief clerk of the Patent Office, appeared before the court, and made an argument in support of the position taken by the Commissioner, which Chief Justice Carter complimented for its ability, but he ordered that the case should be carried up at once to the court by a compliance with usual applications in form to effect that result.

FEW people comprehend the great amount of sugar used annually in the United States. In 1862 there were 432,411 tuns, or 864,822,000 pounds, or nearly twenty-nine pounds to each man, woman, and child, estimating the population at 30,000,000.

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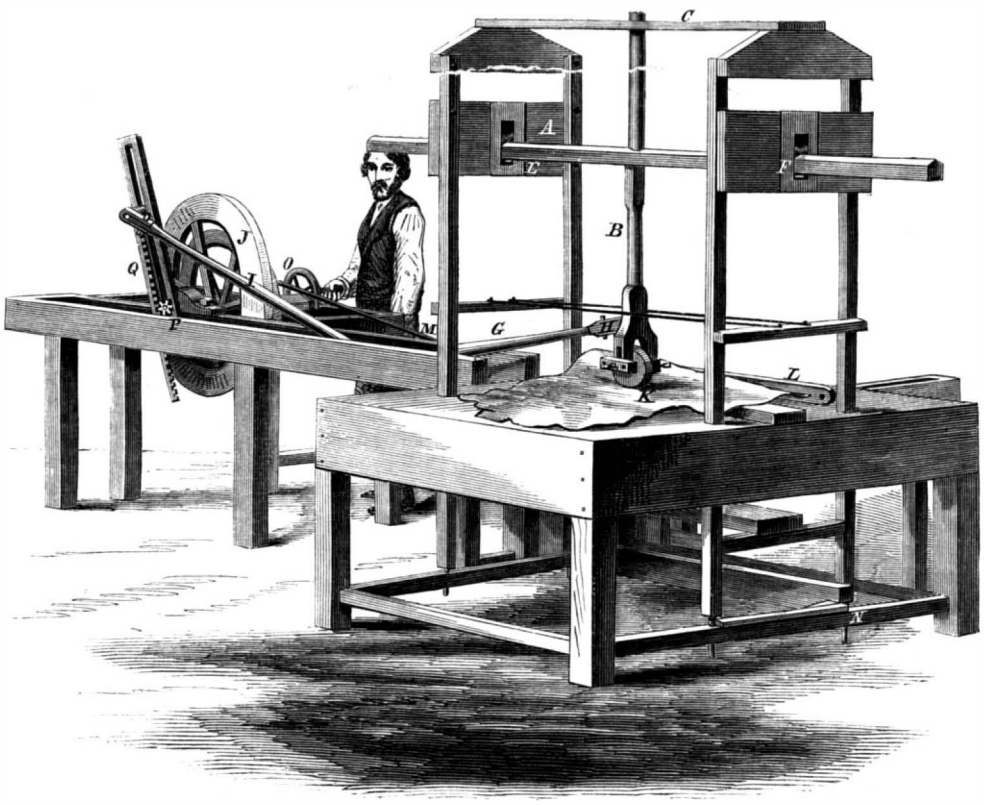
Improved Leather-polishing Machine.

The highly-finished surface of fine leather is usually imparted by hand labor; in this engraving we present a view of a machine for accomplishing this object which does the work in a superior manner and effects a great saving in time and labor. The construction and operation of this machine is as follows:—The framing, A, carries a vertical shaft, B, which works between two parallel bars, C, at the top, and is connected at D to a bar sliding between two rollers at E and F; this vertical shaft, B, is jointed to the connecting rod, G, which, in turn, is fixed to a crosshead sliding on guides between the timbers, H; from this crosshead proceeds the pitman, I, to the crank wheel, J, which is turned by power of any kind, either steam, water or by hand when neither of the other two are available. The bar, B, has a metallic roller, K, fastened at its lower extremity so that it can be adjusted to suit the nature of the work, and the skin to be polished rests upon a metallic plate underneath it. At one side of the skin may be seen a clamp, L; the skin is attached to this, as shown, and the clamp is then fed over the surface of the table, the roller, which is the polisher, acting on it continually. The belt which drives the feed gear is seen at M. There is also an arrangement for raising the tool stock so that the operator can place another skin underneath the roller or tool when the first one is completed. This arrangement consists in applying a lever at one side of the frame so that the workman can press upon it with his foot and thus accomplish the object. The frame slides through mortises, N, at the bottom. The stroke of this machine may be altered at will by simply turning the hand wheel, O. This wheel is on a shaft that runs through the main driving shaft, and the pinion, P, is secured to it; there is a rack, Q, on one side of the crank which elevates or depresses the pin when the pinion is turned; suitable means are provided for keeping the pin stationary except when it is necessary to move it. These are the principal parts. It is obvious that when the tool stock, B, is put in motion that the sliding action of the wheel, K, will impart a high finish to the leather in a manner apparent to every one without further explanation. These machines are said to work exceedingly well, two of them having already been put in operation. Any desired style of figure can be given and it is warranted to do the work expeditiously and thoroughly. One of them can be seen at work in Stockport, N. Y. The patentees desire to introduce their machine into districts where this labor is now done by hand, and capitalists desiring to embark in this enterprise should address the patentees, R. L. & C. Smith, of Stockport, N. Y. It was patented by them through the Scientific American Patent Agency on the 10th of January, 1860.

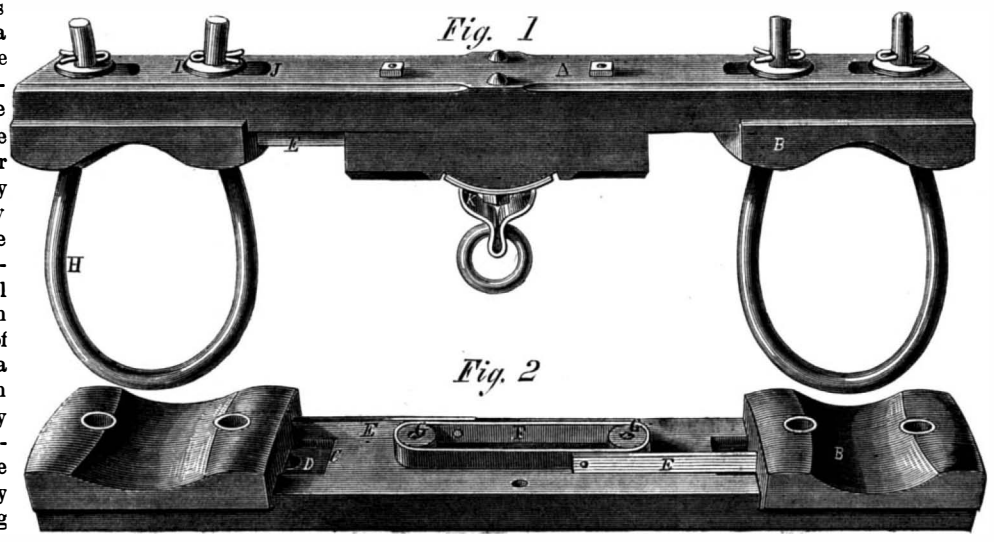


SMITH'S LEATHER-POLISHING MACHINE.

Improved Ox Yoke.

Those who have witnessed the practical every-day work on a farm must have been struck with the imperfect means by which oxen are usually attached to the yoke, and how severely it taxes them at times, not only by its weight but because of its rigid and unyielding nature. The usual pace of the ox is slow and stately, and in his progress he naturally swings his ponderous head from side to side with even measure; but with the ordinary ox yoke all this is denied him, and he must literally "bow to his yoke" and bear its burden as best he may. The consequences of this badly-arranged ox yoke are, that the beast is chafed and fretted by it; that he works with much less willingness, and gets wearied out sooner than he would if the yoke were adapted to his natural habits.

In the engraving herewith presented we have a yoke which is very different from the old-fashioned one, and much better suited to the peculiarities previously alluded to. In addition to this paramount consideration it is very much lighter, neater looking, and, it is believed, altogether a great improvement. In Fig. 1 we have an elevation of this yoke in which A is the yoke proper, and B the bolster or saddle which spans the beast's neck. These bolsters slide back and forth on the yoke, being connected together in the manner shown in Fig. 2. By referring to this figure the reader will see that there are grooves, C, in the yoke, and that the bolsters have projections, D, which fit in them; he may also see that there is a metallic bar, E, connected to the bolsters on the yoke; these bars are strongly fastened to the endless belt, F, which runs upon the rollers, G. It is easy to see, as the bolsters are moved back and forth on the yoke, the belt will run over the rollers and cause them to work evenly and easily as often as the oxen move their heads. Uneven roads and the natural habits of the ox are thus accommodated, and the result is a much greater amount of work with less fatigue to the cattle. The bows, H, also pass through metallic bushes, I, and the yoke beam has slots, J, in it through which the bows move as the bolsters approach or recede from the center. The eye-bolt in the center is also fitted to a semicircular seat, and the plate, K, has slots in it also, so that it can slip from side to side. This yoke is very strong and well made; it is correct in principle, and we hope to see it generally substituted for those so long in use. It was patented on the 4th of November, 1862, through the Scientific American Patent Agency by T. D. Lakin, and assigned to himself and Charles Wilder, of Peterboro', N. H. For further information address Charles Wilder, as above.



LAKIN'S PATENT OX YOKE.

New Rolling Mills in Pittsburgh.

Quite a number of new rolling mills have been put up by Pittsburgh manufacturers during the past year. Messrs. Lyon & Shorb, of the Sligo Works, have put up a mill two hundred feet in length by one hundred and four feet in width, capable of turning out armor plates of the largest size; the firm has also erected a sheet mill ninety feet long by eighty feet wide. The Messrs. McKnight, of the Birmingham Works, have erected a new sheet-iron and armor-plate mill, the buildings of which are sixty by eighty feet. The plate mill has a capacity of fifty tuns per week, and is constructed with a view to the rolling of sheet-iron, for the production of which it has a capacity of one thousand tuns a year. The Messrs. Jones & Laughlins, of the American Works, have erected a building two hundred by one hundred and twenty-five feet, within which is constructed two sheet mills, and a twelve-inch train for bar, and three eight-inch trains for small iron and hoops; three heating furnaces and two annealing furnaces. The capacity of these mills is thirty tuns per day. Messrs. Reese, Graff & Dull have built a forge, a plate mill and a sheet mill, occupying a building two hundred and five by one hundred and five feet. The plate mill is constructed for rolling armor plates for naval uses, ten feet long and from one to one and a half inches thick, weighing from one thousand six hundred pounds to a tun each. The plate mill has a capacity of one hundred tuns, the sheet mills a capacity of fifteen tuns, and the forge of two hundred and ten tuns a week. They have also erected a hoop mill of two trains with a capacity of eighty tuns per week, the mill building of which is one hundred and twenty by seventy-five feet. Messrs. Kloman & Philipps, and Messrs. Wharton, Brothers & Co., have each put up a new mill.

THE Pacific-coast gold mines yielded ore to the value of $52,500,000 last year.

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EXPLOSIONS OF STEAM BOILERS.

In Manchester, England, there exists an association of engineers who carefully survey every disaster of this kind upon its occurrence, and report the prominent features which, in their opinion, were the cause of the accident. They not only do this, but they also inspect the boilers of all persons who are members of the society, from time to time, as they deem necessary, so that every reasonable chance of explosion may be anticipated, and the proper means taken to prevent it. The results of this organization are forcibly shown by the report; out of 36 boilers which exploded in 1863, but one of them was under the charge of the association, and this was an exceptional case; all the others ran their chance, as we may say, and suffered accordingly.

By a tabular statement given in the London *Engineer* we find that the principal cause of explosion with most boilers was corrosion—chiefly external. The report also mentions that damp, or "sweat," as it is sometimes termed, formed between the walls in which the boilers were set, and thus caused the injury spoken of.

Careful and deliberate synopses of the several disasters enabled the members of the inspecting committee to arrive at the conclusion that one-sixth of the explosions which occurred could be traced *directly* to this external corrosion. From this it appears, that however important it may be to examine the interior of the boiler, it is also of vital importance to investigate the outside, especially those parts which are either in immediate contact with the setting walls, or else so covered by them as to prevent thorough ventilation.

A very general opinion prevails that explosions arise either from shortness of water, tampering with the safety-valve, or excessive pressure. An examination of the table alluded to does not warrant this assumption, for out of thirty-six explosions only two were from excessive pressure, four from scarcity of water, and but one of the cases of over-pressure was caused by carelessness, the other being an inadvertency.

"The consideration that has been given in the preceding remarks to the thirty-six explosions that occurred during the year 1863, and of which the circumstances were ascertained, clearly shows, that, however complicated the subject of steam boiler explosions has been made to appear, and however numerous and ingenious the theories may be that are propounded from time to time by way of explanation, yet on a close inspection of the simple facts in each case, the whole question with regard to those under consideration admits of a very clear solution; and that the occurrence of all the explosions, with the exception only of that of a locomotive boiler, may be attributed to one or the other of two causes, viz.—either to the defective construction of the boiler in the first instance, or to the defective treatment it received in the second, that treatment in some cases extending over a term of years, till it reduced the boiler to an unsafe state, and in others producing immediate explosion by a reckless tampering with the safety-valve, neglecting the water supply, or by other careless mismanagement. It is important that this view should be clearly brought before steam users, since the subject has too frequently been enveloped in mystery, and where mystery begins the adoption of vigorous measures for prevention is sure to end. The public have been sadly misinstructed upon this subject. It is true that they are duly informed, by means of the newspapers, of the frequent occurrence of boiler explosions, as well as of the loss of life and damage to property resulting therefrom; but on carefully looking through all the reports that were currently circulated throughout the past year, as to the causes of these explosions, it may safely be stated, that, as a rule, they were incorrect, and only tended to mislead, so that the opportunity was lost of making the facts of one explosion serve as a guide to the prevention of the recurrence of others.

"Many other illustrations might be given, but these will suffice to show the mistaken views too often entertained and promulgated with regard to the cause of boiler explosions, while it will be seen, that with such evidence and such reports, there is but little prospect of any progress being made, and therefore that this association will render important assistance to the cause of the prevention of steam boiler explosions, by circulating correct information of all the circumstances connected with their occurrence."

Why shall we not have some such association as that in this country? We have in this city alone hundreds of steam boilers, some of which are *never* properly inspected, and the vast number of accidents occurring from the use of steam render it imperative that some action should be taken immediately. Who will move first in this matter?

THE NEW CALL, AND BREECH-LOADERS.

The President has issued a call for 200,000 more men for our armies; and if the complement is not previously filled by enlistment, a draft is to be made on the 15th of April next. By the letter of Colonel Wilder, published on page 170 of our current volume, it was shown that long experience in practical warfare has fully demonstrated that one regiment armed with good breech-loading rifles is equal to at least three regiments armed with muzzle-loaders. By the reports from our great armory at Springfield we learn that a large portion of the force is still employed in the manufacture of muzzle-loading small-arms.

The experiences of this great war are rapidly teaching lessons in all departments of the military art. If the heads of the War Department decided a few years ago against the use of breech-loaders by infantry, the results of the large experiments in practical warfare which have since been made, and which have changed the opinions of so many of our officers, demand, at least, a new examination of the subject. And, considering the enormous effort and expense required to send a single regiment to the field, this examination cannot be too promptly made.

A REMONSTRANCE AGAINST THE EXTENSION OF THE GOODYEAR PATENT.

We notice that our hint to those who are opposed to the extension of the Goodyear patent—to get up remonstrances against it and send them on to Congress—is being acted upon. Senator Sumner has presented a remonstrance from manufacturers in Lowell, and others are in circulation for signatures. We have before us the petition of Thomas J. Mayall, of Boston, who has devoted a great deal of time to making improvements in the manufacture of india-rubber. In a letter addressed to us and referring to our discussion of the subject, Mr. Mayall says:—"I have read, with much satisfaction, your articles in the last two numbers of the SCIENTIFIC AMERICAN, upon the application for the extension of the Goodyear patent. I do not know that I can now add anything to the lucid manner in which you have presented the injustice which would be worked upon a class of the community who, to say the least, have been and still are of vital importance, in a pecuniary point of view, to the licensees under that patent—I mean the inventors—that class of the great public whose contributions to the welfare and pride of our country are more worthy of protection than the 'soulless corporations,' who oblige them to sell their brains for a 'mess of pottage.' I enclose to you my 'remonstrance,' and bid you 'God speed' in your righteous undertaking."

The "remonstrance" to which Mr. Mayall refers is addressed to Congress in the following words:—

That he has read the petition of Charles Goodyear, Jr., executor of Charles Goodyear, deceased, for the extension of Letters Patent granted to Charles Goodyear, deceased, for the invention of vulcanized india-rubber.

That he believes he can prove, to the satisfaction of your honorable body, that said Charles Goodyear and his legal representatives have been amply rewarded for his said invention, and that the public has been sufficiently taxed for the same.

That the extension prayed for would be an act of injustice to this remonstrant for the following reasons, among others:—

Your remonstrant has made many and valuable inventions in the manufacture of india-rubber, for some of which he has procured Letters Patent, and for others of which he has applied and intends to apply for Letters Patent.

That, by reason of the monopoly enjoyed by licensees of Charles Goodyear, your remonstrant has been compelled to sell to them many of his inventions for merely a nominal consideration, and so has been deprived of all benefit thereof, while said licensees have made large sums of money therefrom.

That, if the monopoly of said Goodyear and his licensees is longer continued, your remonstrant will be deprived of all benefit from the remainder of his inventions aforesaid during said continuance.

That, as your remonstrant is informed and offers to prove, the very parties for whose benefit the continuance of this monopoly is now sought, are the same parties who, by reason of their position, have derived great benefits from the inventions of your remonstrant, whilst, at the same time, they compelled your remonstrant to part with them for a nominal consideration.

Your remonstrant will prove the foregoing averments when, and as, your honorable body shall direct, and for the above reasons, he earnestly remonstrates against the passage of the act prayed for.

The above remonstrance presents the question very simply and squarely to every inventor. No matter whether they are studying out india-rubber inventions or are engaged in other departments, the great underlying principle is the same. The question is, shall one inventor and his heavy manufacturing monopolists so control the legislation of the country as to prevent all other inventors from making and using their own improvements, and shall the people continue to be taxed to support such a scheme? We cannot believe that Congress will ever sanction such an outrageous system.

THE MONITOR TURRETS.

In the field of abstract science speculation is pardonable, but in dealing with matters of fact we cannot rely upon the opinions of a select few, however oracular their utterances may be. The London *Mechanics' Magazine*, of February 26th, contains a comparison between "Captain Coles' and Captain Ericsson's Turrets," with several engravings intended to illustrate the principal features of each. We have watched the progress of Coles' cupola-ships and cupolas, and have read much of the advantages of the inclined sides of the Coles' cupolas and their power of deflecting shot. Our London cotemporary now presents to its readers something quite different from those of which we have read so many glowing descriptions. It now appears that Captain Coles has adopted the American "turret"—a structure perfectly cylindrical, of nearly the same internal dimensions, height, and diameter, as those of the monitors, but sunken below decks for one-half of its height. The inclined sides have vanished with the old name; the name and form have both disappeared. Our "cousins" have adopted the Ericsson turret (they *even call it "turret"*) and now deride us for preferring it to their clumsy adaptation of Ericsson's ideas, which are set forth in Coles' plans. We consider their course most wise and a high compliment to the skill of Capt. Ericsson.

We cannot, however, pass unnoticed the erroneous comparisons which the *Mechanics' Magazine* institutes between the English and American mode of building and applying the turrets. Our cotemporary has evidently been grossly imposed upon by the draughtsmen in delineating the monitor turrets, and

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by the historian in recording the performances of the monitors. He bases his argument against our turrets on the supposition that the monitor system has utterly failed in practice, because, during the short initiatory action at Charleston on April 19, 1863, some slight derangements occurred to some of the turrets; but he ignores the fact that those were so slight that all the vessels were reported ready for action the morning after the conflict. He appears not to know that, several weeks before the Charleston attack, some of the monitors had been engaged with batteries in Southern rivers for days without sustaining any damage which impaired their efficiency. Is it possible that the *Mechanics' Magazine* is so completely misinformed on a subject immediately within its sphere, as to be ignorant that the monitor fleet, *after* the first attack, has been for several months engaged with the Confederate batteries near Charleston? All Europe knows that each monitor has been hit hundreds of times. The records at the Navy Department show that, for instance, the *Patapsco* has been in action twenty-eight times. Not a single shot has penetrated the side armor, pilot-house or turret, and the latter revolves as freely now as when it first left the constructor's yard. Not the slightest injury has been received by any person on board, neither has any damage to her turret engines or other steam machinery been sustained, notwithstanding the severe ordeal to which this monitor has been subjected. In the face of these incontrovertible facts, the *Mechanics' Magazine* perverts history by telling its readers that the Ericsson turret is a failure.

We have carefully examined the engraving of Capt. Coles' turret, and we advise the inventor thereof to pay a visit to some of our monitors off Charleston to ascertain how they are constructed, and learn the effect of glancing shot—such shot as we employ on this side of the Atlantic—on the decks. The apt sailor will see at a glance that the first Yankee projectile (not a sixty-eight pounder) which strikes the deck of the *Royal Sovereign*, near the opening through which the turret protrudes, will close said opening by forcing the plating against it and effectually prevent the turret from turning.

We have been greatly amused on looking at the slight covering which Captain Coles places over the opening between the turret and deck. The captain, it strikes us, lacks practical knowledge, but he has made out a case for himself by depicting the monitors with bolt heads on the outside, which they never had, and his own with countersunk heads, which the monitors *always* had. The editor of the *Mechanics' Magazine*, who enters the arena in Coles' behalf, is evidently unaware of the crushing effect which a large cast-iron shot striking Coles' turret would produce on his delicate means for covering the opening around the turret; nor does he seem to understand that the fragments of broken shot and shell would fall into this opening and wedge the turret so that it never could be turned; the holiday experiments on the *Trusty* to the contrary notwithstanding. The idea of placing half the turret below the deck, as Captain Coles now proposes, is not new; there are numerous plans and models in possession of the Navy Department at Washington, on this principle, and even the little *Keokuk* was so built. There is scarcely a square foot of surface on the turrets of some of the monitors now off the Southern coast that is not marked or indented by shot. It would be waste of time to prove that if built on the Coles' system, these turrets would have been jammed with fragments entering the opening in the deck, and that all monitors built with his turrets would have been condemned after the first action as worthless. It is a distinguishing feature in the Ericsson turret, that the fragments of broken shot cannot interfere with its rotation. The engraving in the *Mechanics' Magazine*, intended to show this detail of the Ericsson turret, is wrong in every particular, and grossly erroneous at the junction of the turret and pilot-house. The heavy wrought-iron ring, five inches thick and fifteen inches wide, attached to the base of the former, and the massive ring bolted to the turret roof for preventing shot from hitting the base of the pilot-house, are not shown at all in the engraving, being omitted, doubtless, to make the comparison strong. The guard plates covering the nuts of the bolts which hold the plates of the turret and pilot-house together, are also omitted in the engraving, and any one who should build such a turret as the *Mechanics' Magazine* presents, might justly be accused of having taken leave of his senses.

An absurd statement is put forth concerning the breaking of the bolts, and projection of the nuts inwards. The facts in this case are simply that the inadvertent omission of the guard plates in the *Nahant's* pilot-house caused a *solitary accident*, which was at once guarded against by attaching the detail alluded to, and not a single accident has since occurred from this source. Our cotemporary should have known this before making the broad assertion that the Ericsson turrets and pilot-houses are unsafe on account of flying nuts. It is discreditable to any journal, at this day, not to know that our monitors and their turrets afford absolute protection, not only to their crews, but also to their own mechanism.

The misstatement of our cotemporary about the want of proper means for giving orders from the pilot-house to the engine-room is ludicrous. We have no "call-boys," as in the theatres, but we transmit orders to engineers by bell-signals. "Ah," he says, "but the bell-wires get shot away!" This is another error, and as sensible an objection as it would be to dispense with the smoke-stack because that is likely to get hit.

The arguments (?) presented against the American system of building turrets and protecting hulls, by a series of thin plates, exposes a want of correct knowledge on the subject unpardonable in a mechanical journal. On page 197 may be found an extract from a paper bearing on this question of laminated protection, which it is hoped will be the means of giving those desirous of information some new ideas on the subject; and as the positions taken in it are fully sustained by practice, it becomes additionally valuable.

We look upon the plan of placing the *stationary* pilot-house on the top of the *revolving* turret as a feature of paramount practical importance in the monitor system, besides being a mechanical inspiration of the first degree; but our London cotemporary intimates that this structure is useless, and gravely calculates the number of square feet of surface which it offers to the enemy's shot! Why should we argue this point? Surely every practical person can appreciate the perfect control which this location of the pilot-house gives the commander. In action his place should be near the helmsman, and above the gunners. What other vessel than a monitor, with the pilot-house placed over the battery, fulfills the conditions stated? Not one. Captain Coles, with his nautical acquirements, surely cannot fail to admit the great advantage of this arrangement, though the editor of the *Mechanics' Magazine* cannot comprehend it.

We look in vain for any means of closing the port-holes of the Coles' turret, for none are shown in the *Mechanics' Magazine*. In the monitors the ports are closed by means of a massive bent block of wrought iron, which revolves on "centers;" one man can operate it with ease. A change of direction of 90° suffices to open or close the port-hole by this simple and efficient contrivance. We advise Captain Coles to copy this port-stopper at once. Now that he builds *turrets* in place of "cupolas," we wish for the credit of our system that he should also close his ports as we do.

The points of superiority claimed by Captain Coles for his turrets are eminently untenable. When the English ships have borne the weight of shot which has been hurled against our monitors with as little injury, it will be time to boast; but all speculation and experiments in dockyards are idle, and ill befit the grave character of the subject. We have confined ourselves to facts, and have more to offer should these prove unsatisfactory.

THE CENTIGRADE THERMOMETER.

If the metrical system of weights and measures is introduced in this country, the adoption of the centigrade thermometer will doubtless constitute a portion of the reform. Indeed, independently of the metrical system, this instrument is gradually coming into use throughout the civilized world. It has already been generally adopted by men of science in all countries; and the time cannot be very far distant when it will be everywhere employed by the mass of the people.

To grade a thermometer we want two natural standards of uniform temperature, and among the numerous standards furnished by nature, in the freezing and boiling points of various liquids and the melting points of different metals, the two best adapted to the purpose are the freezing and the boiling point of water.

The centigrade thermometer makes the freezing point of water zero, and the boiling point 100 degrees above.

Fahrenheit's thermometer is based on a series of errors and blunders. Gabriel D. Fahrenheit was an instrument-maker, of Amsterdam, who made some important improvements in thermometers about the year 1720. These improvements were suggested by Römer; and Fahrenheit has acquired universal fame by adopting them. The use of mercury as the liquid was a good thing; but the fixing of the zero point and the graduation of the scale were both absurd. The space between the freezing and boiling points was divided into 180 degrees, on what grounds nobody knows; and the zero was fixed at 32° below the freezing point, from the false notion that at that point there was entire absence of heat, or absolute cold.

The centigrade thermometer was devised by Celsius, of Sweden, in 1742, and was introduced into France, along with the metrical system of weights and measures, at the time of the Revolution.

SPECIAL NOTICES.

LOUISA RESSEGINE, administratrix of the estate of Wm. F. Ressegine, deceased, late of Brooklyn, N. Y., has petitioned for the extension of a patent granted to him on June 11, 1850, for an improvement in spring mattresses.

It is ordered that the said petition be heard at the Patent Office, Washington, on Monday, May 23, 1864.

ALEXANDER C. TWINING, of New Haven, Conn., has petitioned for the extension of a patent granted to on him Nov. 8, 1853, and ante-dated July 3, 1850, for an improvement in manufacturing ice.

It is ordered that the said petition be heard at the Patent Office, Washington, on Monday, June 20, 1864.

F. P. DIMPFEL, of Philadelphia, Pa., has petitioned for the extension of a patent granted to him on July 16, 1850, for an improvement in steam boilers.

It is ordered that the said petition be heard at the Patent Office, Washington, on Monday, June 27, 1864.

All persons interested are required to appear and show cause why said petitions should not be granted. Persons opposing the extension are required to file their testimony in writing, at least twenty days before the day of hearing.

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week; the claims may be found in the official list:—

Hand-pegging Machine,—In this machine a blunt-ended awl is employed also as a driver and is automatically thrown up, alternately to a greater and a less hight. Tho peg strip rests against the side of the awl when the latter is in its lower position, so that a blow of a hammer will force the awl into the leather, and at the same time a peg is separated from the strip by a knife working on one side of and parallel with the awl. The awl is then thrown up to a sufficient hight to admit the peg beneath its end, so that a second blow of the hammer will drive the peg into the hole already formed. Luther Hall, of Boston, Mass., is the inventor of this machine.

Knapsack Hammock.—This invention relates to an article constructed of india-rubber cloth or analogous water-proof material, adapted to be readily converted into either a hammock or knapsack, said cloth being provided with a pocket or pouch to contain small articles, which pocket may serve the purpose of a pillow when the article is used as a hammock. A. Wm. Sus, of New York city, is the inventor of this improvement.

THE gunboat *De Soto* has thus far proved herself the most successful of all the vessels on the Atlantic blockade. She has captured seventeen blockade runners, whose aggregate value is near $1,200,000.

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ISSUED FROM THE UNITED STATES PATENT-OFFICE

FOR THE WEEK ENDING MARCH 8, 1864.

Reported Officially for the Scientific American.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

41,824.—Hydrostatic Scales for indicating Tunnage of Boats.—Amory Amsden, Springfield, Ohio:

I claim, first, The process hereinbefore described for arranging or locating a hydrostatic scale accurately at the dead point or center of motion of a boat or vessel, for the objects specified.

Second, The slide; H′, employed in the described combination with a hydrostatic scale, to adapt the entire apparatus to be placed below the deck when not in use.

41,825.—Retting Flax and Hemp.—George W. Billings, New York City:

I claim the retting of flax or hemp, straw or stalk, or other analogous fibres by sections at intervals so as to produce a uniform even and uninjured fiber, substantially as described and set forth.

41,826.—Cleaning and separating the Fibers of Flax and Hemp.—George W. Billings, New York City. Antedated Feb. 21, 1864:

I claim the loosening and dissolving of all resinous matters, silex and other foreign and deleterious substances from flax, hemp and other fibrous substances of like or analagous character by fermentation and removing the same by washing, and the moisture by drying, substantially as described and set forth.

41,827.—Lock.—Edward W. Brettell, Newark, N. J.:

I claim, first, In locks the employment of tumblers, M N, &c., mounted in the turning part, E, adapted to be adjusted by the thrusting motion of the key, and to present their ends simultaneously against the bridge, G, substantially in the manner and for the purpose herein set forth.

Second, I claim, in connection with the above, bracing the bent tumblers, M N &c., by an arm, E2, extending from the cylinder, and arranged substantially as herein set forth.

41,828.—Envelope.—Howard C. Bristol, St. Clair, Mich.:

I claim, first, So forming a letter envelope substantially as shown and described, that when the same is sealed it shall present two fronts, having a smooth unbroken surface, upon one of which the superscription may be written and upon the other an advertising card printed.

Second, I claim a letter envelope constructed with a single flap, d, coincident wiih the length of the body of the envelope, and with reduced end flaps coincident with the width of the body of the envelope, substantially as and for the purpose set forth.

41,829.—Fast and Loose Pulley.—Charles H. Brown, Fitchburg, Mass.:

I claim the fast and loose pulley, A, sliding brakes, D D, springs, e e, wedges, g g, and brake supporter, C, combined and arranged as described and for the purposes specified.

41,830.—Egg-hatching Apparatus.—Thomas Carter, Covington, Ky.:

I claim, first, The provision in an apartment, A, warmed and insulated in the manner described, of the egg receptacle, F, the same being capable of elevation and depression within the apartment, substantially as and for the purpose set forth.

Second, The combination of the apartment, A, heater, B, and vaporizing vessel, E, all constructed, arranged and operated as described.

Third, In the described combination with a vertically adjustable receptacle, F, I claim the automatic egg-turner, K, operated by mechanism substantially as specified.

41,831.—Harvester-cutter Sharpener.—Isaac H. Coller, Poughkeepsie, N. Y.:

I claim bevelling and sharpening the two contiguous edges of a mowing or harvesting cutter-bar, at one operation, by straddling a conic or A-shaped wheel with the two contiguous edges of adjoining blades of such bar, substantially as described.

41,832.—Preparing Artificial Fuel.—Dominic E. Contaret, New York City:

I claim the use of compounds known in chemistry under the name of insoluble soaps, in order to effect the agglomeration of small common fragments of anthracite, and obtain the infusible fuel prepared as described.

41,833.—Curd-cutter.—Josiah Crosby, Rome, N, Y.:

I claim as a new article of manufacture a curd-cutter and worker, consisting of a series of knives, A A, handles, D E, and rod, C, all constructed and arranged as herein shown and described.

41,834.—Yarn-delivering Mechanism for Looms.—George Draper, Milford, Mass.:

I claim my said yarn delivery mechanism, or combination substantially as described, the same consisting of the ratchet, i, the pawl, l, the arm, m, the gravitating catch, p, the weight, r, or their mechanical equivalents combined with the guide, F, and the yarn beam, substantially in manner and so as to operate as hereinbefore specified.

I also claim the combination therewith and with the lay, in the manner substantially as described of the stopping mechanism, to operate as and for the object hereinbefore explained.

And I claim the gravitating catch and its arm or carrier to operate together and with the ratchet, substantially as specified.

41,835.—Mode of converting Motion.—John W. Drummond, New York City:

I claim the combination of a belt and crank-pin with a pair of pulleys or wheels, and a cross slot for producing a reciprocating movement as specified.

41,836.—Apparatus for straightening and polishing Cylindrical Bars or Tubes.—George Walter Dyson, Tinsley, England:

I claim rolling and polishing pieces of solid metal or tubing of cylindrical shape by passing them between rolls in a direction in a line bisecting the angle of inclination of the axes of the rolls to each other, that is in a direction nearly parallel with the axes of the rolls, instead of a parallel direction or one at right angles thereto.

Also the use of rolls the axes of which are inclined to each other and which are made to rotate in the same direction, through and between which metal rods, bars and shafts or tubing are made to pass by the rotation of the rolls aided by guides, for the purpose of giving a cylindrical shape to such bars, shafts or tubing, and at the same time, if desired, polishing the same.

41,837.—Car Coupling.—Carlton Foster, Oshkosh, Wis.:

I claim, first, The construction and use of the eyes, k, connected to levers, g, for the purpose of receiving and holding in position the coupling pins, e, and operating them in their respective bunters, as herein described and set forth,

Second, In combination with the foregoing I claim the mode of securing the connecting links as at d d, for the purpose described.

Third, The combination of said eyes, levers, links and hooks, m, and bunters, a a a′ a′, in the manner and for the purpose herein set forth.

41,838.—Clothes-fastener.—Pinckney Frost, Springfield, Vt.:

I claim a clothes-fastener constructed and operating substantially in the manner and for the purpose set forth.

41,839.—Rendering Compasses insensible to Local Attraction.—John S. Gisborne, Birkenhead, England, and Wm. Simpson, Liverpool, England. Patented in England Feb. 14, 1863:

We claim by means of electricity, however obtained, rendering compasses, or the magnetic needles in compasses for ship's and other purposes, insensible to local attraction, convenient practical constructions and arrangements being illustrated on the accompanying sheet of drawings and herein delineated.

41,840.—Lubricating Compound.—George W. Gladden, Cincinnati, Ohio:

I claim lubricant composed of residuum from the distillation of petroleum, pine tar, and plumbago compounded, substantially in proportions and manner specified.

41,841.—Printing Press.—George P. Gordon, Brooklyn, N. Y.:

I claim, first, Taking the unprinted sheet from the feed table, presenting it properly to the type for the reception of the impression, relieving it from such impression and carrying it to and depositing it upon the pile table, by the use of one and the same set of reciprocating automatic nippers, whether constructed and operated in the precise manner shown or in some equivalent way to produce a like result.

Second, The combination of said reciprocating automatic nippers with a cylinder or segment of a cylinder which shall have a part rotary with a return movement.

Third, I claim the nipper trip, V, and the nipper guide, z, in combination with the reciprocating bed and the reciprocating nippers; and these in combination with the cylinder or segment of a cylinder, which shall have a part rotary with a return movement.

Fourth, The combination of the tympan sheet holders with the cylinder or segment of a cylinder, for the purpose shown.

Fifth, I claim rotating reciprocating nippers to file the sheet (heretofore patented by me), when combined with a cylinder or segment of a cylinder, operating substantially as shown.

Sixth, The filling the printed sheets by the use of one and the same set of reciprocating automatic nippers, directly before or in front of and under the eye of the operator, so that he may at once detect any imperfection in the impression (as heretofore patented by me), when combined with a cylinder or segment of a cylinder, substantially as described.

41,842.—Harvester.—Samuel B. Haines, Lewistown, Pa.:

I claim, first, The combination of the enclosing and rotary drum, B, and pivoted gear frame, F, arranged and operating substantially as described.

Second, The combination with the frame or arm, F, constructed and arranged as described, of the slotted head, C′, adapted to permit the vertical motion of the said frame and brace it horizontally as explained.

Third, In combination with the drum, B, I claim the gear frame or arm, F, provided with the concavity in its upper surface as represented, to receive the pitman and combine lightness, strength and rigidity.

Fourth, The main frame, C C1 C2 C3, constructed substantially as described and attached to the wheels, A A, or drum, B, in any suitable manner.

Fifth, The combination of the segments or pinions, d′, cogged rims, E, and lips, e, with the pawls, b b, and wheels, A A, for throwing the parts in and out of gear, substantially in the manner explained.

Sixth, The pawl, P, constructed with an elastic shank, p, and operating in the manner and for the purposes specified.

[In this machine the gearing is enclosed within a drum which is rotated by driving wheels, or by direct contact with the ground and through the medium of which motion is communicated to the working parts; the advantages of the invention being lightness, durability, efficiency of operation, and cheapness of construction.]

41,843.—Mode of ringing Bells.—James Harrison, New York City:

I claim the combinaiion of the gear wheel, C, with the hub, D, and shank, E, fitted to a corresponding hole in yoke, A, making a perfect right angle joint at the point, D, and the bolt holes, 1 2 3 4 5, for the purpose of fastening the wheel to the bell as specified.

I also claim the combination of levers, M, with the working pawl, N, and check dog, L, ratchet wheel, J, and screw or worm, K, and cam, P, with friction roller, O, for the purpose specified.

I also claim the combination of cap, G, with hole in center to fit nut, F, that bears the weight of the bell and slots, g g g g, to fit lugs, v v, on yoke, A, substantially as described.

I also claim the working of lever, M, through the arm of yoke, A, and the ears, A′, on yoke, A, substantially as described.

41,844.—Explosive Shell.—Thompson D. Hart, Philadelphia, Pa.:

I claim securing the bars, C, around the body of the shell, A, in the manner described as and for the purpose specified.

41,845.—Bridle and Bit Connection.—Charles B. Hogg, Boston, Mass.:

I claim the improved bridle bit, having each of its rings made with the prongs, b b, and passage, c, arranged substantially as described.

And in combination with a ring, a, made with prongs, b b, and a passage, c, arranged as described, I claim the rein or strap, R, as made with the holding loop, A, and arranged within such loop and so as to be applied to the ring, substantially as described.

41,846.—Lamp Burner.—Henry C. Hutchinson, Cayuga, N. Y.:

I claim a deflected wick tube with a lateral opening for the flame, substantially as described, wher eby a wide flame may be obtained from a small wick tube and a free access of air to the base of the flame, in whatever direction it may burn from the tube.

41,847.—Washing Machine.—Samuel S. Johnson, Virden, Ill.:

I claim, first, The combination of the tub, A, convex plate, E, bar, F, cleats, E′ E′, roller, G, and levers, H H, constructed and operating in the manner described.

Second, In combination with a machine of the construction above specified, I claim the furnace, C, arranged and operating in the manner and for the purpose set forth.

[This invention consists in the employment in connection with a washing apparatus of a fire-box or furnace, located beneath a metallic bottomed tub, whereby the clothes may be boiled and at the same time subjected to the action of the rubbing apparatus, and thus means for most thoroughly cleaning the same.]

41,848.—Revolving Fire-arm.—Ben Kittredge, Cincinnati, Ohio:

I claim a metal shield constructed substantially as described, and placed between the cork and nipple to throw the fire laterally from the nipple.

41,849.—Washing Machine.—Joel Lee, Galesburg, Ill.:

I claim the pedestal, A, the shaft, D, the segment, H, the pinion, E, the yoke, K, the cross bars, C, and the rods, m, the whole constructed and arranged substantially as and for the purpose herein set forth.

41,850.—Filtering Cisterns.—Philemon Markley, Canton, Ill.:

I claim a filtering cistern in the form of a hollow globe, with the chamber for unfiltered water directly above the cistern, thereby giving a filtering surface equal to the circumference of the water chamber, with the water chamber and cistern having a common base, to-wit: the lower half of an 8-inch globe wall.

41,851.—Rolls.—Benjamin Merritt, Jr., Newton, Mass.:

I claim a pressure roll consisting of an exterior metallic shell, A, supported on a metal shaft, B, having heads or bearings at b a, placed at or about one-fourth the length of the roll from its ends, and the shaft reduced in diameter each side of said bearings, in the manner and for the purpose substantially as set forth.

41,852.—Cinder-washer.—James M. Meschutt, New York City. Ante-dated Feb. 20, 1864:

I claim the rotary or oscillating bucket or ash receptacle, c, sustained by and moved on the center pin, b, in a pail or water receptacle for washing cinders, as set forth.

41,853.—Butter-worker.—Solon E. Morse, Montgomery, Vt.:

I claim the improved butter-worker as made with the grooved inclined plane, E, the perforated table, A, and the layer of cloth, B, the whole being arranged and constructed substantially in manner and so as to operate as specified.

41,854.—Corn Planter.—J. Y. D. Murphy, Half Moon, Pa.:

I claim, first, In combination with the side plates, B, unobstructed at their forward ends, a sliding seeding mechanism composed of a grain duct or passage, n, and the bell-crank levers or arms, o, for opening and closing the same, substantially in the manner and for purpose described.

I also claim in combination with the sliding plates and their grain ducts or passages, the hoppers, P, attached thereto, and operating in connection with the seed hoppers, D, substantially as described.

I also claim the combination of the three springs, e k k, with the cam, and with the plates, m m, for the purpose of more readily raising up the plates without requiring so much resistance as one spring alone would require from the drive wheels to compress it, as herein above described and represented.

41,855.—Sugar-cutting Machine.—James H. Murrill, Baltimore, Md.:

I claim the employment of the vibrating knives, h h, in combination with the armed rollers, G G, in the manner and for the purposes substantially as set forth.

I claim the arrangement of a slabbing saw, B, and reciprocating frame, e e e, and hopper, C, in combination with rollers, G G, and knives, h h, in the manner substantially, and for the purpose of cutting sugar into lumps.

41,856.—Stencil Plate.—John C. Nye, Cincinnati, Ohio:

I claim the combination of the holding frame, A, having grooved or hollow ways, a a, therein, with the wired, or otherwise enlarged and stiffened guide edges, b b, of the letter plates, B B, in the manner and for the purpose herein specified.

I also claim the combination of the enlarged abutting edge sof the letter plates with the intermediate overlapping edges, h h, thereof, for the purpose herein set forth.

41,857.—Revolving Fire-arms.—William Palmer, New York City:

I claim, first, The employment of a grooved carrier, k, intermittently revolved by automatic mechanism, for presenting a chamber containing the charge to be fired, to the rear end of the barrel and holding the same in place while being fired, as set forth.

Second, I claim a hopper slide or opening, e, combined with said revolving carrier, when such hopper slide or opening is so located that the chambers placed therein descend into the said carrier by gravity, as set forth.

Third, I claim a shield, d, in combination with said rotary carrier, k, and hopper slide or opening, l, when said shield extends from the base of the hopper slide or opening, l, to the point at which the chamber, i, is brought into line with the barrel for firing, as specified.

Fourth, I claim a revolving cam, n, in combination with the rotary carrier, k, for giving progressive motion to said carrier and allowing a pause while the piece is being fired, as set forth.

Fifth, I claim the employment of automatic mechanism to press the chambers to the rear of the barrel and then withdraw the same, in combination with the rotary carrier, also moved by automatic mechanism, so that the motions are in unison, as set forth.

Sixth, I claim the metallic case cartridge, r, formed and acting as specified in combination with the detached chamber, i, receiving the same as specified.

Seventh, I claim the combination of the rotary carrier, k, cams, n and p, and hammer, o, in the manner specified, the parts being so formed and timed that the motions are harmonious, for the purposes and as set forth.

Eighth, I claim the bridle piece, q, in combination with the cam, n, and rotary carrier, k, for drawing back the chambers, i i, and rotary carrier, as specified.

Ninth, I claim the ring, g, or its equivalent, in combination with the rotary carrier for withdrawing the chambers, i i, as the carrier is moved, as set forth.

Tenth, I claim the disk, m, and its pins, 3 3, in combination with the cam, n, and its grooves, 4 and 5, for the purposes and as specified.

41,858.—Apparatus for distilling Rock Oil and other Hydro-carbons.—Elijah Freeman Prentiss, Philadelphia, Pa., & Robert Adam Robertson, Liverpool, England. Patented in England July 31, 1862:

We claim, first, The combination of the still, A, the injecting worm, a4 a5 a6 a7, and the central tube, G G′ G″.

Second, Roughening the surface of the injecting worm or tube, a5 a6 a7, to render the ebullition regular and quiet.

Third, The combination of the still, A, with the series of columns, three or more, each column being set and maintained at the temperature necessary to separate the product condensible at such temperature, whereby at one continuous operation the crude oil is separated with the various products due to condensation at the different temperatures fixed upon.

Fourth, The arrangement of the vapor tubes and oil spaces in columns, B B‴ or C C‴, whereby the crude oil on its way to supply the still, A, is made to act as a condensing bath to the vapors in these columns, coming from the still, A.

Fifth, The arrangement of the columns, B B‴ and C C‴, in combination with the still, A, and the movable exit tube, g″, whereby the operation of the still is rendered continuous.

Sixth, The air regulator, or its equivalent, for regulating the temperature of the respective columns or either of them in combination with the pipes of supply of the heating and cooling media.

Seventh, The water legs, X, and the floats, Z, for regulating the escape of water from the columns.

Eighth, The auxiliary heads, V V′, for enabling the oil-bath in each column to act as a still.

Ninth, The warming of the bottoms of the chambers which are at the bases of the columns by means of steam chambers arranged and operating as shown above.

Tenth, The warming of the bottom of the column on which the still, A, is supported, substantially as above described.

41,859.—Hay-shocking Machine.—Nathaniel W. Plymate, Freeland, Iowa:

I claim the shock-frame constructed of the frame or sash, Y Y, and teeth or bars, A A A, when combined with the rotating rake, and used in the manner and for the purpose herein set forth.

41,860.—Wire Harness.—Adam R. Reese, Phillipsburgh, N. J.:

I claim, first, The use of wire rope or cord in bridles or harness, substantially in the manner and for the purposes set forth.

Second, The formation of solid loops in wire harness, substantially in the manner and for the purposes set forth.

41,861.—Apparatus for punching and shearing.—Sylvester Renfrew, Marseilles, Ill.:

I claim the cutter-plate, G, secured to the shank of the metal punch, in combination with the stationary cutter-plate, d, secured to the frame of the punch to form a combined metal cutter and punch, substantially in the manner and for the purposes herein described.

I also claim in combination with the combined metal-cutter and punch the toggle links, I K, link, L, and hand lever, M, substantially in the manner and for the purposes described.

41,862.—Lithographic Printing Press.—Edwin Reynolds, Mansfield, Conn.:

I claim imparting the upward motion to the movable tooth, g, by means of the rod, h, arm, i, rocker shaft, k, arm, r, and cam, q, operating together in the manner substantially as described.

I also claim the combination of the rod, h, lever, v, catch, a2, and arm, i, for entirely arresting the descent of the tooth, and the operation of the tympan, as set forth.

I also claim the combination of the pins, k4, and projection, h4, operating together substantially as described to lock the tympan in position, when the movable tooth is out of gear with the rack.

I also claim the combined operation of the cams, q and f2, for controlling the arrest of movement of the tympan, substantially as specified.

I also claim operating the nipper jaws, n2 m2, to close them and to cause them to remove the sheet from the tympan frame, by the combined action of the pin, e3, lever, s2, and projection, f3.

I also claim constructing the stationary damper with folds, in the manner and for the purpose substantially as described.

41,863.—Hand Loom.—Conrad Roder, Ceralvo, Ky.:

I claim, first, Communicating motion to the tension beam, B, from the batten, d, by means of the arm, l, lever, m, pawl, n, ratchet, o, and intermediate gearing, substantially as specified.

Second, I claim in combination with the tension beam, B, the use of the removable ratchet, o, or a series of similar ratchets spaced or

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adapted to the thread or yarn used as filling in the web, as herein set forth.

Third, In combination with the batten, d, the use of the springs, r r', substantially as and for the purpose specified.

41,864.—Padlock.—Louis C. Rodier, Springfield, Mass.:

I claim, first, The employment in padlocks of a locking spring moving, when actuated by turning a key either to the right or to the left, transversely to and out of the path of the bolt, substantially as herein shown and described.

Second, In combination with a locking spring vibrating under the action of a key turning on a fixed pin within the lock case either to the right or to the left, transversely to the path of the bolt, I claim the cam-shaped hook on the end of the said bolt for operation as set forth.

Third, I claim the arrangement in combination with a side locking spring and hinged bolt, operating as described, of wards cast to the front plate of the lock case, as shown and set forth.

Fourth, In combination with a bolt-locking side-spring, I claim a yoke, or the equivalent thereof, actuated by a spring as described to securely hold the side-spring when locking the bolt and when arranged in relation to the key so that when turned either to right or left it shall cause the release of the spring, substantially as herein set forth.

Fifth, I claim in combination with the bolt-locking spring and spring-locking yoke, a spring connected with or disconnected from the yoke spring arranged within the casing of the lock relatively to the bolt and the yoke so as to constantly bear on the yoke and to throw out the bolt when a key is applied from without to actuate the yoke and side-spring, as shown and described.

41,865.—Stump Extractor.—Charles Rundquist, Knoxville, Ill.:

I claim the guide, F, vertical screw, G, grooves, f f, in uprights, B B, and radical conical rollers, c c c c c, as herein arranged and combined operating, substantially in the manner and for the purpose specified.

41,866.—Safety Cleat for releasing Sails of Vessels.—John W. Sharret, Portsmouth, Va.:

I claim, first, A cleat constructed with a pivoted tongue, a', substantially as and for the purposes described.

Second, The extended latch, d, formed on the pivoted tongue, a', of a cleat in combination with a pendulum, D, or its equivalent, substantially as described.

Third, Releasing the sails of vessels by means of an automatic device constructed and operating substantially as described.

41,867.—Joiners' Gauge.—Christian Sholl, Mount Joy, Pa.:

I claim a gauge, the stem of which is comprised of three or four separate stems, each independently adjustable and held by a single thumb-screw, substantially in the manner shown and for the purpose specified.

41,868.—Spring Tension Regulator.—Thomas Silver, New York City:

I claim the combination of a spring with an eccentric, substantially as described for the purpose specified.

41,869.—Damper.—Charles C. F. Stender, Chicago, Ill.:

I claim, first, The combination of one or more deflectors, G G', with the sliding damper or register, D, and valve plate, A, substantially as and for the purpose described.

Second, The combination of one or more deflectors, G G', with an oscillating valve, A, substantially as and for the purpose described.

41,870.—Knapsack Hammock.—A. Wm. Sus, New York City:

I claim, as a new article of manufacture, the army knapsack hammock hereinbefore described, consisting of the webbing, A, pouch, D, shoulder straps, B B, slinging cords, C C C C, and ties, E E, all constructed, combined, and arranged, in the manner and for the purposes specified.

41,871.—Distilling Rock Oil.—Alexis Thirault, New York City:

I claim, first, Subjecting petroleum or rock oil to repeated evaporations by condensing the vaporous products in one and returning the condensed liquid to the still through another pipe, substantially as and for the purpose specified.

Second, The arrangement of the condensing pipe, D, funnel-shaped conductor, E, and return pipe, F, in combination with the still, A, constructed and operating substantially as and for the purpose described.

Third, The arrangement of the rectifier, H, in the interior of the still, A, in combination with the condensing pipe, D, funnel-shaped conductor, E, return pipe, G, and condensing pipe, I, all constructed and operating, substantially in the manner and for the purpose herein specified.

41,872.—Grain Winnowers.—Henry B. Thomas, Cascade, Iowa:

I claim the mode of suspending the upper and second shoe by means of the notched spring plates, H, attached to the sides of the mill and to the shoe as seen in the drawings of Figs. 4 and 2.

I also claim the second shoe having a perforated plate and three overlapping hinged plates for discharging small seeds at the sides of the machine through the discharge channels as arranged in relation to the pair of reciprocating rock-shaft screens in combination with the lever arm, L, and connecting rod, M, substantially in the manner and for the purpose herein set forth.

41,873.—Medicine for Wounds, Inflammation, &c.—Otto Troemel, Manitowoc, Wis.:

I claim the production of the above described solid and stone-like mass by the mixture and melting of the above-named ingredients, substantially as and for the purpose set forth.

41,874.—Telescopic Sight for Fire-arms.—Joseph M. Trowbridge, United States Army:

I claim, first, A cross-line diaphragm mounted adjustably within a telescope attached rigidly to a fire-arm, whereby the instrument is rendered secure from derangement by ordinary military and sporting usage.

Second, Securing the diaphragm, D, adjustably within the telescope, A, by springs, E E', reacting against set screws, F F', substantially as and for the purposes set forth.

41,875.—Apparatus for raising Sunken Vessels.—Edward Turner, Baltimore, Md.:

I claim the combination of the lifting screws, gearing, and chains, constructed and arranged as herein described, with two or more trussed beams, which beams rest on two or more floats or vessels, for the purpose of raising the sunken vessel, in the manner herein described.

41,876.—Foot-stove.—Abner T. Upham, Canton, Mass.:

I claim the improved foot-stove as made not only with the foraminous top, but with the chambered guard arranged with respect to such top and the lamp, substantially in manner and so as to operate as described.

41,877.—Saw-mill.—Lorenzo Vance, Philadelphia, Pa.:

I claim, first, The combination and arrangement of the rotating disk, C, sliding frame, E, frame, I, carrying the saw, a, and the means of adjusting them severally or singly when constructed and operating, substantially as described.

Second, The arrangement of the sliding frame, E, the saw frame, I, and saw, a, when constructed and used, substantially as and for the purpose specified.

Third, The adjustable pulley-frame, Q, and pulleys, P P, in combination with the saw frame, I, and sliding frame, E, and its adjusting devices when arranged, to operate as described.

Fourth, The rotating frame, R, having adjustable feed rollers, c c, with their adjusting and operating devices in combination with a driving shaft, T, having two universal joints, substantially as described.

41,878.—Producing Mixed-colored Woolens, &c.—Stanislas Vigoureux, Rheims, France:

I claim the manufacture of mixed-colored woolen and other threads from filaments dyed, printed, or colored in sections, in the manner hereinbefore described.

41,879.—Rubber Boots and Shoes.—Benjamin H. Webb, North Cambridge, N. Y.:

I claim the combination of a tube, or what is equivalent, with boots and shoes that are made of india-rubber or other material requiring ventilation, substantially as and for the purpose set forth.

41,880.—Tools for drawing Spikes.—Charles T. Webber & Paul Iverson, Janesville, Wis.;

We claim the combination of the adjustable steel point, b, with the main bar, a.

Also the combination of the flexible fulcrum, c, with the said bar, substantially as described.

41,881.—Blank for Horse-shoe Nails.—Milton D. Whipple, Cambridge, Mass.:

I claim, as a new article of manufacture, a blank for horse-shoe nails, substantially of the form herein shown and described.

41,882.—Canister Shell.—William S. Williams, Canton, Ohio:

I claim, first, The peculiarly-formed hemispherical chamber, C, in the described combination with the shoulder, h, and final explosive chamber, D, for the purposes specified.

Second, The combination of the perforated plate, H, resting upon a shoulder, h, the tapering tube, I, permanently attached by its smaller ends to the plate, H, around the aperture, i, and the cap, F, with a tapering neck, f, fitting within the large end of the tube, I, all as herein shown and described and for the purposes specified.

Third, The fusible guard, e, applied to the orifice of the fuse, E, in the manner and for the purposes explained.

[This invention relates to a shell carrying a charge of canister shot which may be projected from it at any desired period during or at the termination of its flight, at any desired interval after which the entire shell explodes.]

41,883.—Automatic Railroad Switch.—J. P. Woodbury and N. Ames, Boston, Mass.:

We claim, first, Attaching a pendent or depressible arm permanently to the longitudinal center of the axle, substantially as set forth and for the purpose described.

Second, Combining with the arm, d, permanently attached to the longitudinal center of the axle, either a horizontal or vertical roller, F and G, substantially as and for the purpose described.

Third, holding the arm, d, in a perpendicular position by means of the start, e, or its equivalent, in combination with links or a cleat attached to the bottom of the car by bolts so small as to break when required, substantially as described.

Fourth, Connecting and raising the two arms, d and d, by means of a single spring, substantially as described.

Fifth, The combination of the windlass, J, chain, I, and box, D, substantially as and for the purpose set forth.

41,884.—Pegging Machine.—C. H. Binger and W. E. Fischer, Boston, Mass., assignors by mesne-assignments to Alfred B. Ely, Newton, Mass.:

We claim a mechanism, substantially as herein described, for alternately operating by percussion to give long and short strokes to the instrument, a.

41,885.—Rotary Hair Brush.—E. G. Camp, Bristol, England. Patented in England, March 11, 1862:

I claim the construction and employment of circular brushes or apparatus, whether magnetized or not, for brushing the human hair and skin, made to act substantially in the manner hereinbefore described.

41,886.—Washing and Wringing Machine.—John Cram (assignor to himself and John S. Cram), Boston, Mass.:

I claim the improved mode of making the elastic covering of each of the elastic washing rollers, viz., of a solid tube of vulcanized rubber, or other equivalent material, grooved helically from end to end, as described.

I also claim the combination of the single yoke lever and the holding devices thereof with rollers operating together, substantially as described.

41,887.—Printers' Inking Roller.—Lewis Francis (assignor to himself and Cyrus H. Loutrel), New York City:

I claim the use or employment of the ingredients specified, when combined to form a composition for the manufacture of printers' inking rollers.

41,888.—Pegging Machine.—Luther Hall, Boston, Mass. (assignor through mesne-assignments to Alfred B. Ely, Newton, Mass.:

I claim interrupting the motion of the awl and employing it as a driver upon each alternate stroke, for the purpose described.

I also claim interrupting the upward motion of the driver every other time it ascends, to prevent the feeding of the peg strip until after the peg is cut off and the hole is made to receive it.

I also claim the combination of the boss, I, the block, G, the switch, d, and the pin, c, or their equivalents, operating as set forth for the purpose specified.

41,889.—Tool-rest for Turning Lathe.—Addison Hathaway (assignor to Ames Manufacturing Co.), Chicopee, Mass.:

I claim, first, The combination of a ball-and-socket joint with a stationary post to form an adjustable tool-rest for engine lathes, substantially as described.

Second, The combination in a tool-rest for lathes of a stationary post, a rocking and a rotating rest, and a set screw, arranged and operating as set forth for the purposes specified.

Third, The combination of a stationary post with the ball of a ball-and-socket joint, having an elongated slot to vary the vertical position of the tool while the post remains stationary, as and for the purposes set forth.

41,890.—Automatic Railroad Car Brake.—P. R. Higley assignor to W. P. Sproule), Oshawa, Canada:

First, I claim a brake for wheel vehicles, held in contact with the wheel by a weight or spring and retracted therefrom by the power applied to draw the vehicle, substantially as described.

Second, I claim the combination of the draw bar, C, connecting rods, E F' J, links, f, levers, F K G G, and pin, k, all operating in the manner described to retract the brakes by either the forward or backward movement of the cars.

[In this invention the power applied to move the cars forward or backward is caused to act upon the brakes and throw the same out of contact with the wheels automatically, and when the cars stop or the speed thereof is slackened, the brakes are thrown on by means of suitable springs or weights.]

41,891.—Razor.—John Kinloch (assignor to himself, Archibald Catanach and Adam Catanach), Philadelphia, Pa.:

I claim the toothed guard arranged in respect to the blade of a razor and rendered reversible on and detachable from the same, substantially as and for the purpose herein set forth.

41,892.—Stove.—Francis Magre (assignor to himself and T. H. Coneys), Boston, Mass.:

I claim the combination and arrangement of the supplying and heating chamber, B, with the fire chamber, A, and the surrounding smoke space or chamber, D.

I also claim the combination and arrangement of the air-supplying and heating chamber, B, the fire chamber, A, the surrounding smoke space, D, and the auxiliary chamber, G.

I also claim the peculiar fire-chamber dome as made in two parts, g h, and with one of them extended above the other so as to form therewith the crescent or equivalent-shaped educt, i, the smaller being provided with air-discharging openings arranged in it, as described.

I also claim the arrangement of air-holes in the sides of the throat of the fire-place and out of the air-heating chamber, so as to discharge air across the throat, in manner and for the purpose specified.

41,893.—Hay and Cotton Press.—Wm. Bidenour and M. K. Biser, Springfield, Ohio, assignors to themselves and George Fry:

First, In a horizontal baling press of the construction specified, we claim the hinged and grated discharge door, L l l', applied and operating in combination with grooves, J J, in the manner and for the purposes set forth.

Second, In combination with the above we claim the slanting blocks, K K, at the ends of the floor channels, J, for the object specified.

41,894.—Countersink.—H. S. Shepardson (assignor to himself and F. R. Pratt and W. H. Maynard), Shelburne Falls, Mass.:

I claim in a countersink to be used with a boring tool, the making of the countersink to only partially surround the shank of the bit, and the cutting lip to work concentrically with the bit, and the throat of the countersink to conform to the clearance of the bit, all as herein described and represented.

41,895.—Hat and Velvet Polish.—J. A. Thompson, Auburn, N. Y.:

I claim a hat and velvet polish, with an interior metallic case into which may be introduced heated fluids or sand.

41,896.—Gear Wheel and Pulley.—George I. Washburn, Worcester, Mass.:

I claim a compound wheel constructed of metal, substantially as herein shown and described, so that each member, while forming part of the body of the wheel, will also constitute a clamp to hold the parts together.

[This invention consists in a metallic gear wheel or pulley, formed in two or more parts, adapted by their peculiar construction to be passed around a shaft and firmly secured thereto, without being slipped over the ends thereof. An illustrated description of this invention will shortly appear in our columns.]

41,897.—Stove.—Wm. E. Hagan, Troy, N. Y., assignor to John B. Gale:

I claim, in the management of combustion in fire chambers, the application, substantially as herein described, of superheated steam, in jets, so as to impinge, without admixture with atmospheric air, directly against the incandescent coals, in addition to or in combination with the supply, separately, of atmospheric air, either by draught or blast, in the usual manner, as set forth and for the purpose specified.

I also claim, in the construction of fire chambers for the combustion of fuel and provided with apertures at or near the bottom for the admission of atmospheric air, combining therewith a steam chamber or chambers for superheated steam, the inner wall of the steam chamber or chambers, having numerous small apertures next to the fuel for the escape of the superheated steam to impinge, without admixture of atmospheric air, against the incandescent coals, substantially as and for the purpose specified.

And I also claim, in the construction of fire chambers, combined, substantially as herein described, with a chamber or chambers for superheated steam, and with numerous apertures for the escape of jets of superheated steam to impinge against the incandescent coals, making the perforated wall of the fire chamber grooved, or the equivalent thereof, to reduce the thickness of the wall at the perforations, substantially as and for the purpose specified.

RE-ISSUES.

1,627.—Machine Belting.—Thomas J. Mayall, Roxbury, Mass. Patented Nov. 24, 1863:

I claim the combination of fibers of leather with sulphur, india-rubber or gutta-percha, separately or combined with litharge or other metallic oxides, with or without the use of any of the other ingredients mentioned in the specification, when the compound is subjected to artificial heat to produce the product as herein described.

1,628.—Cotton Gin.—Enoch Osgood, New York City. Patented Dec. 23, 1863:

I claim, first, The combination of the elastic roller, A, with the concave bar, B, connected and operating together substantially as described.

Second, The combination of the elastic roller, A, the concave bar, B, and the endless apron, C, arranged and operating together, substantially as described.

Third, The combination and arrangement of the elastic roller, A, the concave bar, B, and the cleaning plate, E, constructed and operating together, substantially as described.

Fourth, The cleaning plate, E, constructed with grooves in its inner side, and operating in combination with devices for drawing the fiber through said grooves, substantially as described.

Fifth, The cleaning plate, E, constructed with teeth formed by grooving its inner side and beveling its lower edge, and operating in connection with devices for drawing the fiber between said teeth, substantially as described.

1,629.—Inkstand.—Joseph W. Ross, Boston, Mass. Patented April 30, 1861:

I claim, first, The use of the float, k, traveling in a suitable guiding tube and operating substantially as hereinabove described.

Second, So arranging and constructing an ink-well or fountain that its cover or top surface can be brought flush or nearly so with the top of the desk and so that the cover or ink-well cannot be locked in or removed from the same without the use of a key or other instrument, substantially as set forth.

1,630.—Hat-stand and other Clothes-hanging Apparatus. John B. Wickersham, New York City. Patented June 2, 1857:

I claim attaching the hooks of hat-stands and other clothes-hanging apparatus, so that said hooks can be turned around horizontally, substantially as and for the purposes specified.

1,631.—Construction of Steam and Sailing Vessels for Naval and Merchant Service.—Augustus Walker, Buffalo, N. Y. Ante-dated May 23, 1863. Patented Aug. 25, 1863. Re-issued Jan. 19, 1864:

First, I claim constructing a vessel with one or more longitudinal arches or truss frames applied in vertical position to the central part of the hull for the purpose of strengthening it, substantially as set forth.

Second, I claim a vessel bottom constructed with a central keel, C, two concavities, c c, and two straight and horizontal or nearly horizontal surfaces, b b, all extending longitudinally throughout the length of the vessel, substantially as shown and described.

Third, I claim the combination of a central longitudinal truss framing or arch with a double concave bottom, constructed substantially as herein described.

Fourth, I claim the doubly-arched prow or ram, D3, constructed and supported as described.

Fifth, I claim the dome or turret, G, formed and supported substantially as shown and described, and adapted to be revolved either independently of or in connection with the gun carriage.

Sixth, I claim the inner turret or gun carriage, G', constructed separately from the dome or outer turret, G, so as to be revolved either independently of or in connection therewith.

Seventh, I claim the method of ventilating by the construction and method of insertion of tubes or flues, substantially as set forth and described herein.

Eighth, I claim closing the ventilating tubes, I1 I2, by the stach-ns, J J, substantially as described.

Ninth, The casing, H, constructed with a circular arch, h, for sustaining the turret, G or G', substantially as specified.

Tenth, In connection with a vessel of the above construction, I claim the sliding pilot houses, K K, elevated and sustained in any way substantially as described, either by windlass or stationary screw.

Eleventh, The described position and means of working the anchors.

1,632.—Rake to Grain Harvesters.—Walter Wright, Chicago, Ill., assignee by mesne-assignments of Jearum Atkins. Patented Dec. 21, 1852:

I claim an automatic rake for harvesters which is supported, guided and impelled by a vertical shaft and by contrivances sustained by or placed around the same, the said shaft and other contrivances being all placed upon the inner side of the machine or of its platform, when such rake acting alone shall rake and deposit the gavel upon the inner side of the newly-cut swath, and shall then return to its proper position for raking the next gavel, in such a way as to swing clear of the standing grain as well as of the unraked grain, which is then lying upon the platform, all by means of a motion of this shaft upon its axis, with its necessary appurtenances, substantially as above described.

1,633.—Rake in Grain Harvesters.—Walter Wright, Chicago, Ill., assignee by mesne-assignments of Jearum Atkins. Patented Dec. 21, 1852:

I claim, first, An automatic rake for harvesters which shall singly and alone rake and deposit the gavel with the straw nearly at right angles to the line of draft, when such rake is controlled in its movements by contrivances no part of which shall be placed upon the outer side of the machine, substantially as described.

Second, An automatic rake for harvesters which shall singly and alone rake and deposit the gavel with the straw nearly at right-angles with the line of draft when such rake is sustained, guided and impelled by contrivances so placed on the inner side of the machine as not to be liable to become entangled either with the cut or with the uncut grain, substantially as described.

Third, An automatic rake for harvesters which singly and alone shall rake and deposit the gavel so far on the inner side of the newly cut swath as to be out of the way of the horses on the next round, and then swing back to its proper position for raking a new gavel in lines which shall both in plan and elevation be substantially different from those described by its various parts in making its forward movement, thus keeping clear of the standing grain as well as that which

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lies upon the platform, when the movements of said rake are accurately directed in without the use of any exterior guide or other fixture for that purpose, substantially as described.

Fourth, In an automatic rake for harvesters I claim the employment of a palm, or its equivalent, by which, in connection with the said rake the gavel may be firmly grasped, when said arrangement is so contrived as to provide for a yielding pressure between the rake and the palm so as to be accommodated to the size of the gavel, substantially as described.

Fifth, In a harvester I claim the use of an automatic rake which shall rake the gavel to the inner side of the machine when in combination with a palm, or its equivalent, it shall grasp and turn and deposit it so that the straw shall lie perpendicularly to the line of draft, or nearly so, substantially as described.

Sixth, In a harvester I claim the use of an automatic rake which, by a rapid movement in a direction nearly parallel with the cutter bar shall rake the gavel and then by a slower movement shall return outward and back to its proper position for commencing a new gavel so as not to interfere with the cut or with the uncut grain, when all the contrivances for giving such motion shall stand upon the inner side of the machine, substantially as described.

Seventh, In a harvesting machine I claim a turning shaft or cram post, the action of which constantly preserves the same angle with the platform, in combination with a rake which has an undulating or swinging motion communicated to it through its arm or handle to bring it back after raking one gavel, to its proper position for commencing another by means of an oscillating or rotary motion of said turning shaft upon its axis, substantially as described.

DESIGNS.

1,909 to 1,919.—Carpet Patterns.—Henry G. Thompson, New York City, assignor to the Hartford Carpet Co., Hartford, Conn.

PATENTS

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FOR SEVENTEEN YEARS!

MUNN & COMPANY,

In connection with the publication of the SCIENTIFIC AMERICAN, have acted as Solicitors and Attorneys for procuring "Letters Patent" for *new inventions* in the United States and in all foreign countries during the past *seventeen years*. Statistics show that nearly ONE-THIRD of all the applications made for patents in the United States are solicited through this office; while nearly THREE-FOURTHS of all the patents taken in foreign countries are procured through the same source. It is almost needless to add that, after *seventeen years'* experience in preparing specifications and drawings for the United States Patent Office, the proprietors of the SCIENTIFIC AMERICAN are perfectly conversant with the preparation of applications in the best manner, and the transaction of all business before the Patent Office; but they take pleasure in presenting the annexed testimonials from the three last ex-Commissioners of Patents:—

MESSRS. MUNN & CO.:—I take pleasure in stating that, while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the office, a marked degree of promptness, skill, and fidelity to the interests of your employers. Yours very truly, CHAS. MASON.

Judge Mason was succeeded by that eminent patriot and state man, Hon. Joseph Holt, whose administration of the Patent Office was so distinguished that, upon the death of Gov. Brown, he was appointed to the office of Postmaster-General of the United States. Soon after entering upon his new duties, in March, 1859, he addressed to us the following very gratifying letter:

MESSRS. MUNN & CO.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you discharged your duties as Solicitors of Patents, while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and I doubt not justly deserved) the reputation of energy, marked ability, and uncompromising fidelity in performing your professional engagements.

Very respectfully, your obedient servant, J. HOLT.

Hon. Wm. D. Bishop, late Member of Congress from Connecticut, succeeded Mr. Holt as Commissioner of Patents. Upon resigning the office he wrote to us as follows:

MESSRS. MUNN & CO.:—It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency; and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully, your obedient servant, WM. D. BISHOP.

THE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a written reply, corresponding with the facts, is promptly sent, free of charge. Address MUNN & CO., No. 37 Park Row, New York.

As an evidence of the confidence reposed in their Agency by inventors throughout the country, Messrs. MUNN & CO. would state that they have acted as agents for more than TWENTY THOUSAND inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of inventors and patentees, at home and abroad. Thousands of inventors for whom they have taken out patents have addressed to them most flattering testimonials for the services rendered them; and the wealth which has inured to the individuals whose patents were secured through this office, and afterwards illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! Messrs. MUNN & CO. would state that they never had a more efficient corps of Draughtsmen and Specification Writers than those employed at present in their extensive offices, and that they are prepared to attend to patent business of all kinds in the quickest time and on the most liberal terms.

PRELIMINARY EXAMINATIONS AT THE PATENT OFFICE.

The service which Messrs. MUNN & CO. render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there; but is an opinion based upon what knowledge they may acquire of a similar invention from the records in their Home Office. But for a fee of $5, accompanied with a model, or drawing and description, they have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through the Branch Office of Messrs. MUNN & CO., corner of F. and Seventh streets, Washington, by experienced and competent persons. Many thousands of such examinations have been made through this office, and it is a very wise course for every inventor to pursue. Address MUNN & CO., No. 37 Park Row, New York.

HOW TO MAKE AN APPLICATION FOR A PATENT.

Every applicant for a patent must furnish a model of his invention if susceptible of one; or, if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the Government fees, by express. The express charge should be pre-paid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by a draft on New York, payable to the order of Messrs. MUNN & CO. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park Row, New York.

Patents are now granted for SEVENTEEN years, and the Government fee required on filing an application for a patent is $15. Other changes in the fees are also made as follows:—

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On application for extension of Patent	$50
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On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
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On filing application for Design (fourteen years)	$30

The Patent Laws, enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The law abolishes discrimination in fees required of foreigners, excepting natives of such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners, except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms. Foreigners cannot secure their inventions by filing a caveat; to citizens only is this privilege accorded.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The Government fee for a caveat is $10. A pamphlet of advice regarding applications for patents and caveats is furnished gratis, on application by mail. Address MUNN & CO., No. 37 Park Row New York.

EXTENSION OF PATENTS.

Many valuable patents are annually expiring which might readily be extended, and if extended, might prove the source of wealth to their fortunate possessors. Messrs. MUNN & CO. are persuaded that very many patents are suffered to expire without any effort at extension, owing to want of proper information on the part of the patentees, their relatives or assigns, as to the law and the mode of procedure in order to obtain a renewed grant. Some of the most valuable grants now existing are *extended patents*. Patentees, or, if deceased, their heirs, may apply for the extension of patents, but should give ninety days' notice of their intention.

Patents may be extended and preliminary advice obtained, by consulting or writing to MUNN & CO., No. 37 Park Row, New York.

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Messrs. MUNN & CO. are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of their Washington Agency to the Patent Office affords them rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Their success in the prosecution of rejected cases has been very great. The principal portion of their charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted, are invited to correspond with MUNN & CO., on the subject, giving a brief history of the case, inclosing the official letters, &c.

FOREIGN PATENTS.

Messrs. MUNN & CO., are very extensively engaged in the preparation and securing of patents in the various European countries. For the transaction of this business they have offices at Nos. 66 Chancery lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. They think they can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through their agency.

Inventors will do well to bear in mind that the English law does not limit the issue of patents to inventors. Any one can take out a patent there.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through MUNN & CO'S Agency, the requirements of different Government Patent Offices, &c., may be had, gratis, upon application at the principal office, No. 37 Park Row, New York, or any of the branch offices.

SEARCHES OF THE RECORDS.

Having access to all the official records at Washington, pertaining to the sale and transfer of patents, MESSRS. MUNN & CO., are at all times ready to make examinations as to titles, ownership, or assignments of patents. Fees moderate.

INVITATION TO INVENTORS.

Inventors who come to New York should not fail to pay a visit to the extensive offices of MUNN & CO. They will find a large collection of models (several hundred) of various inventions, which will afford them much interest. The whole establishment is one of great interest to inventors, and is undoubtedly the most spacious and best arranged in the world.

MUNN & CO. wish it to be distinctly understood that they do not speculate or traffic in patents, under any circumstances; but they devote their whole time and energies to the interests of their clients.

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MESSRS. MUNN & CO., having access to all the patents granted since the rebuilding of the Patent Office, after the fire of 1836, can furnish the claims of any patent granted since that date, for $1.

THE VALIDITY OF PATENTS.

Persons who are about purchasing patent property, or patentees who are about erecting extensive works for manufacturing under their patents, should have their claims examined carefully by competent attorneys, to see if they are not likely to infringe some existing patent, before making large investments. Written opinions on the validity of patents, after careful examination into the facts, can be had for a reasonable remuneration. The price for such services is always settled upon in advance, after knowing the nature of the invention and being informed of the points on which an opinion is solicited. For further particulars address MUNN & CO., No. 37 Park Row New York.

ASSIGNMENTS OF PATENTS.

The assignment of patents, and agreements between patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park Row, New York.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with patent property or inventions to call at our extensive offices, No. 37 Park Row, New York, where any questions regarding the Rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid) should be addressed to MUNN & CO. No. 37 Park Row, New York

TO OUR READERS.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and enclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row. New York.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper when the time for which it was pre-paid has expired.

MODELS are required to accompany applications for Patents under the new law, the same as formerly, except on design patents, when two good drawings are all that are required to accompany the petition, specification and oath, except the Government fee.

RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will always be given; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona-fide* acknowledgement of our reception of their funds.

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Believing that the latter style of binding will better please a large portion of our readers, we commenced on the expiration of Volume VII., to bind the sheets sent to us for the purpose in heavy board sides, covered with marble paper and leather backs and corners.

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Notes and Queries

J. H. O., of C. W.—We thank you very much for the long list of subscribers you have sent us and we appreciate your efforts to increase our circulation. We have no means of obtaining the information you desire, but should we ascertain the number of vessels of all classes in Great Britain and the same in this country, we shall publish it.

A. N., of N. Y.—Soda water is simply pure water saturated with carbonic acid, and is beneficial to most constitutions. The carbonic acid is usually obtained by pouring sulphuric acid upon marble dust. As the sulphuric acid is an active poison, effective measures must be taken to prevent any of it from getting into the beverage. All properly constructed apparatus is so arranged as to accomplish this perfectly.

C. W. H., of ——.You are right about the drill being left-handed. When it was drawn on the block it was right, but of course when printed it became left-handed. Cross the belt on the machine and it will run just as well. No offense taken.

J. S., of Mass.—Write to H. C. Baird, 406 Walnut street, Philadelphia, for a book on locomotive engineering practice. There is nothing more modern than Holley's Railway Practice, which is a large and costly work.

C. C. W., of N. Y.—A good index plate is a difficult thing to obtain. The Novelty Iron Works are said to have an excellent standard from which they will doubtless make you one.

W. M., of Conn.—Shellac varnish is what you require; dissolve shellac to be obtained at the druggists, in naphtha or alcohol till of the required consistency.

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J. H. R., of Mass.—Your small engine of 2 inches bore and 6-inch stroke has a piston area of 3.1416 inches, and at a speed of 200 revolutions per minute and 50 pounds mean pressure, would exert 5.360 of a horse-power, or a little more than half a horse power.

B. G. A., of N. H.—A mere verbal description of an invention to another would not entitle a party to a patent in the face of the fact that another party had reduced it into tangible form either by a drawing or model.

J. F. C., of Canada West.—The idea of constructing a shot with spiral surfaces to produce a rotary motion by the resistance of the atmosphere in firing from a smooth-bore gun is very old. We have now in our office numerous models of shot so constructed. Some have wings as you propose, and some spiral passages through them, others have grooves in front and others grooves in the sides and base. It has been also proposed to construct them with spiral surfaces to be acted upon by the gases of the powder in firing. All experiments that we know of, with such projectiles, have resulted in a failure.

A. C., of N. Y.—If you step into the nearest telegraph office you can see in what direction the wire of an electro-magnet must be wound on its core. By mixing a small quantity of tallow or soap with the shellac it will become tough and not be liable to crack when the wire is wound round the core.

Money Received.

At the Scientific American Office, on account of Patent Office business, from Wednesday, March 9, 1864, to Wednesday, March 16, 1864 :—

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Persons having remitted money to this office will please to examine the above list to see that their initials appear in it and if they have not received an acknowledgment by mail, and their initials are not to be found in this list, they will please notify us immediately, stating the amount and how it was sent, whether by mail or express.

Specifications and drawings and models belonging to

parties with the following initials have been forwarded to the Patent Office, from Wednesday, March 9, 1864, to Wednesday, March 16, 1864 :—

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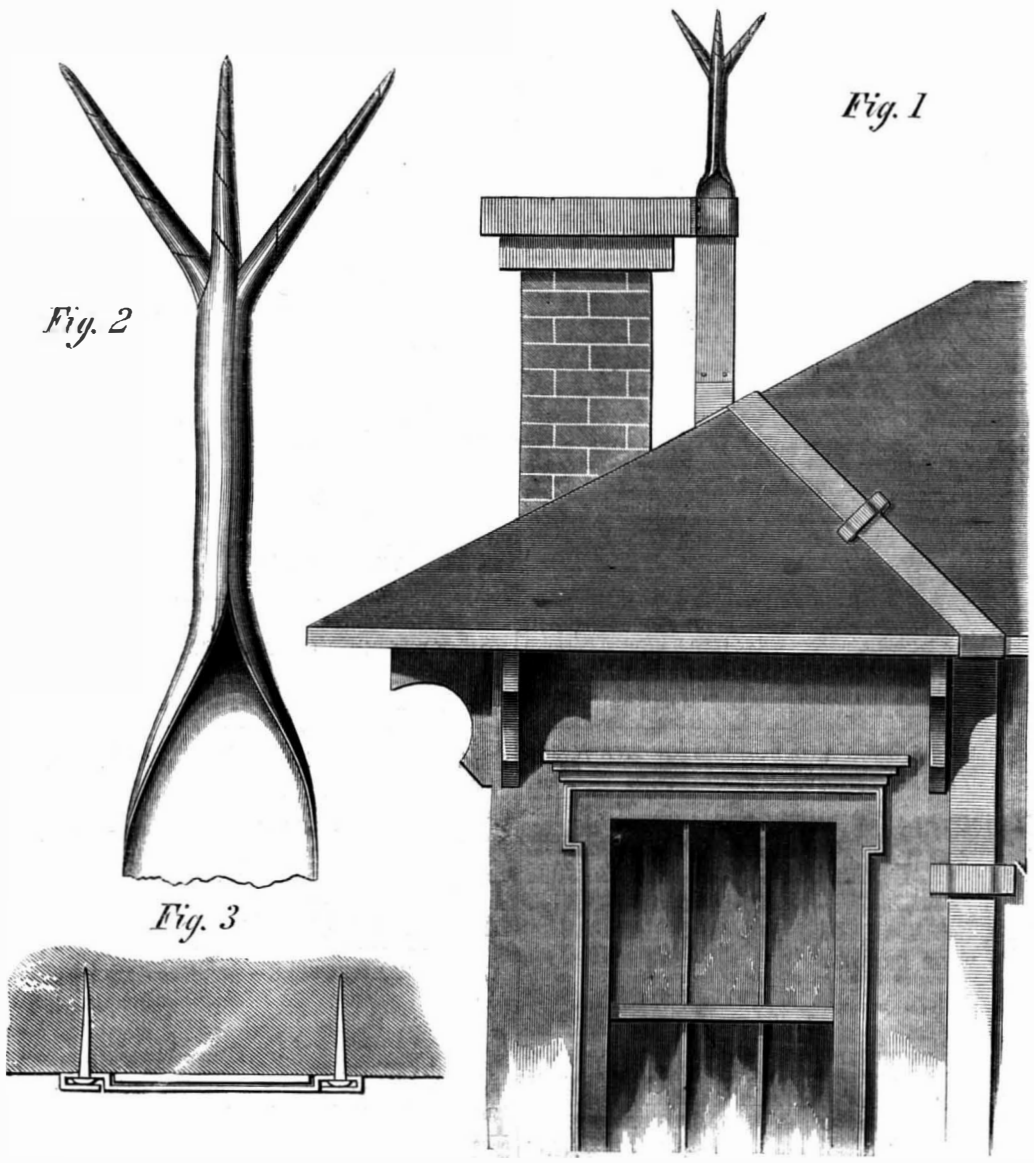
Improved Lightning-Rod.

This form of lightning-rod is of the non-insulated class, and is constructed of pure cold-rolled Lake Superior copper. The conductor itself is of a flat form as shown in the engraving, and is fastened in close contact with the building it is intended to protect. It is continuous in length, and is supported at various intervals by straps of the same material nailed to the house, the ends of the straps being turned over as in Fig. 3, to make a neat appearance. The upper portion of the rod may be coiled up in a tubular form, as shown in Fig. 2, to compose the tip and



BRITTAN'S IMPROVED LIGHTNING-ROD.

point ; the flat shape also permits the conductor to be easily rolled up for transportation. The fact of this conductor being continuous throughout its entire length, without a joint, is a valuable feature, as electricity passes over a smooth surface much more readily than where joints or breaks occur. The close connection between the conductor and the building, the inventor states, is a safeguard against ascending as well as descending currents, and it is claimed that the general arrangement of this continuous non-insulated conductor is safer, much more convenient for adjustment and transportation, than those ordinarily in use. A patent is now pending on this invention through the Scientific American Patent Agency. For further information address the inventor, N. Brittan, Chicago, Ill.

Diseases of Over-worked Men.

Time was when the very phrase, diseases of overworked men, would have been considered foolish, and out of the question ; now, it conveys a truth of national importance, which the nation must consider. From being a comparatively idle word, we have of late become an insane world on the subject of labor. So long as the muscles merely were employed, so long little harm was done ; we remained men ; now we aspire to be gods, and we pay the forfeit of our ambition. From overwork we now get a class of diseases the most prolonged, the most fatal. The suns of our best men go down at noon, and so accustomed are we to the phenomenon that we cease to regard it as either strange or out of place. It is through the mind now that the body is destroyed by overwork ; at all events, it is so mainly. The men of intense thought—men of letters, men of business who think and speculate, men of the state who are ambitious to rule, these men are sacrifices. With them the brain has not merely to act on its own muscles, bidding them perform their necessary duties, but the one brain must needs guide a hundred other brains, and all the muscles thereto appended. An electric battery works a single wire from the City to Brighton, and does its work well, and goes on for some months before it is dead or worn out. Can it do the work of a hundred wires ? Oh yes, it can, but it must have more acid, must wear faster, and will ultimately die sooner. We may protect the plates, make the battery to an extent self-regenerative as the body is ; but, in the main, the waste is in excess of the supply, and the wear is as certain as the day. Men of letters, men of business who do their business through other hands and do great business, and men immersed in politics, suffer much the same kind of effects from overwork. They induce in themselves, usually, when they suffer from this cause, one or other of the following maladies :—Cardiac melancholy, or broken heart ; dyspepsia, accompanied with great loss of phosphorus from the body ; diabetes, consumption, paralysis, local and general ; apoplexy, insanity, premature old age. They also suffer more than other men from the effects of ordinary disorders. They bear pain indifferently, can tolerate no lowering measures, are left long prostrated by simple depressing maladies, and acquire in some instances a morbid sensibility which is reflected in every direction ; so that briskness of action becomes irritability ; and quiet, seclusion and moroseness. They dislike themselves, and feel that they must be disliked, and if they attempt to be joyous, they lapse into shame at having dissembled, and fall again into gloom.—*Social Science Review.*

The Ailanthus Silk-worm in France.

The *Moniteur des Brevets d' Invention*, of Paris, says, that the cultivation of the ailanthus, and of the silk-worm that feeds upon it, is yearly extending in France. Several proprietors in the Department of Vaucluse are making preparations to plant, in the coming spring, some thousands of ailanthus trees, destined to nourish, the following year, their hosts of the new bombyx. It is found that the ailanthus flourishes very well in sandy lands which are worthless for other purposes. Having noticed the success of the ailanthus silk-worm in France some time ago, we wrote to our agent in Paris to forward us some of the cocoons. They recently arrived; and, if we find the subject a hopeful one, the readers of the SCIENTIFIC AMERICAN will be fully advised.

A TRAVELING office-wagon, for the Adjutant General's department of the Department of the Cumberland, has just been completed at the Government shops. It is a new invention, and accommodates seven clerks and a driver, is drawn by four horses, and can be taken apart and put together in a short time.

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